Organizers:

Universidad de Cantabria

Universidad de Oviedo

Hybrid Conference

X EDITION

2024

May 07-10, 2024

REHABEND

EURO-AMERICAN CONGRESS

GENERAL PROGRAMME

Sponsor entities:

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MAPEI

GENERAL PROGRAMME

REHABEND 2024

CONSTRUCTION PATHOLOGY, REHABILITATION TECHNOLOGY AND HERITAGE MANAGEMENT

(10th REHABEND Congress)

Gijon, Spain, May 7th-10th, 2024

PERMANENT SECRETARIAT:

UNIVERSITY OF CANTABRIA
Civil Engineering School
Department of Structural Engineering and Mechanics
Building Technology R&D Group (GTED-UC)
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E-mail: rehabend@unican.es
www.rehabend.unican.es

10TH EURO-AMERICAN CONGRESS ON CONSTRUCTION PATHOLOGY, REHABILITATION TECHNOLOGY AND HERITAGE MANAGEMENT

REHABEND 2024

INDEX

ORGANIZED BY:

UNIVERSITY OF CANTABRIA (SPAIN)
www.unican.es

UNIVERSITY OF OVIEDO (SPAIN)
www.uniovi.es

The **Euro-American Congress REHABEND 2024** on **Construction Pathology, Rehabilitation Technology and Heritage Management** was held in **Gijón (Spain)**, in **May 2024**. The event is co-chaired by the **University of Cantabria** and the **University of Oviedo**.

REHABEND 2024 **continued the series of the nine previous REHABEND international events**, which had been held **since 2006 in different Spanish cities**. The previous one, in **2022**, took place in **Granada, Spain**. In 2022 edition, approximately **280 papers** from around **30 countries** were presented, making it a conference of great interest to those who attended.

Construction Pathology, Rehabilitation Technology and Heritage Management currently hold significant importance in the construction sector. This prompted the organizers to propose a **technical event on these topics in Gijón**. The event aimed to collect the **advances obtained in the last two years** in the **theoretical knowledge** and **practical realizations** carried out on the referred topics. The Congress met around **275 technical contributions** coming from professionals, academics and specialists from more than **30 countries**.

Based on previous experiences, the Congress **is once again proposed within the Euro-American cultural space**. The **official languages** are **English**, **Italian**, **Portuguese** and **Spanish**. Organizers understand that technical articles and oral presentations, with the support of graphic material and schemes, would be understood by participants, as evidenced by previous editions of REHABEND.

Under these premises and the success of previous editions, the Congress is sponsored by the **Government of Spain**, the **Regional Government of Asturias**, **the Municipality of Gijón**, **Laboral Ciudad de la Cultura**, **Gijón Convention Bureau**, **Grupo Puma**, **Mapei, Sika, Tecnalia,** the **University of Cantabria** and the **University of Oviedo**. Additionally, several universities, technical and professional associations, institutes, foundations and companies pledge their collaboration to ensure the success of this initiative.

The organizers of REHABEND 2024 extend their gratitude to the **sponsors and collaborating entities**; the **Scientific Committee members** for their diligent review of technical contributions to ensure the required level of quality for an international event, to the **keynote speakers**, to the different s**peakers** for their valuable contributions, and **all attendees** for their confidence in the event. Sincerely, many thanks to all.

Dr. Ignacio Lombillo
Chairman of the REHABEND 2024 Congress
Associate Professor
University of Cantabria

Dr. Alfonso Lozano
Chairman of the REHABEND 2024 Congress
Associate Professor
University of Oviedo

The University of Cantabria, through its Building Technology R&D Group (GTED-UC), was the promoter of the REHABEND Congresses on Construction Pathology, Rehabilitation Technology and Heritage Management.

The 1st REHABEND Congress was set in motion in Santander, Spain, in November 2006. It became established in the 2nd (Santander, 2007), 3rd (Valencia, 2008), 4th (Bilbao, 2009), 5th (Santander, 2014), 6th (Burgos, 2016) and 7th Congress (Caceres, 2018), all of them carried out in Spanish cities. The 2020 edition was to be held in person in Granada in March 2020, but due to the global health emergency resulting from Covid-19, it had to be held online in September 2020. The 9th edition (REHABEND 2022) took place in Granada, featuring a hybrid format combining in-person presentations with other asynchronous online sessions.

The ability to convene of the nine perfomed editions was prominent, gathering an appreciable number of experts in the topics of the Congress. As a reference, in REHABEND 2022 Congress took part approximately 280 speakers from around 30 countries worldwide.

The covers and ISBN of some the books of papers corresponding to the previous congresses are attached below. The ISSN of the series of REHABEND books is 2386-8198. In addition, since REHABEND 2014, the papers presented at the congress have been indexed in Scopus.

REHABEND 2007
(Book of Papers)
ISBN: 978-84-691-3612-6

REHABEND 2008
(Book of Papers)
ISBN: 978-84-692-5650-3

REHABEND 2009
(Book of Papers)
ISBN: 978-84-8873-404-4

REHABEND 2014
(Digital Book of Papers)
ISBN: 978-84-616-8863-0
(indexed in Scopus)

REHABEND 2016
(Digital Book of Papers)
ISBN: 978-84-608-7941-1
(indexed in Scopus)

REHABEND 2018
(Digital Book of Papers)
ISBN: 978-84-697-7033-7
(indexed in Scopus)

REHABEND 2020
(Digital Book of Papers)
ISBN: 978-84-09-17873-5
(indexed in Scopus)

REHABEND 2022
(Digital Book of Papers)
ISBN: 978-84-09-42253-1
(indexed in Scopus)

SPONSOR ENTITIES

Goverment of Spain

Regional Government of Asturias

Municipality of Gijón

Laboral Ciudad de la Cultura

Gijón Convention Bureau

Grupo Puma

Mapei

Sika

Tecnalia Research & Innovation

COLLABORATING ENTITIES

The Collaborating Entities have been presented grouped in countries, following an alphabetical order. As Collaborating Entities have been considered to all that have contributed at least with two accepted articles in the Congress, or that some of its members formed part of the International Scientific Committee of the Congress / keynote speakers. Finally, in each country, the Collaborating Entities have been ordered according to the number of accepted articles.

UNIVERSITIES

Albania-Epoka University

Argentina-Universidad Nacional de La Plata

Bosnia and Herzegovina-University of Sarajevo

Brazil-Universidade Presbiteriana Mackenzie

Brazil-Universidade Federal de Minas Gerais

Brazil-Universidade de Brasília

Brazil-Instituto Federal de São Paulo

Brazil-Universidade de Caxias do Sul

Brazil- Universidade Tecnológica Federal do Paraná

Brazil-Universidade Federal do Ceará

Brazil-Univ. Estadual Paulista

Brazil-Instituto Federal de Educação, Ciência e Tecnologia do Ceará

Brazil-Universidade Federal de Viçosa

Brazil-Universidade Federal do Espírito Santo

Brazil-Universidade Católica de Petrópolis

Chile-Universidad Austral de Chile

Chile-Universidad de Chile

Colombia-Universidad Nacional de Colombia

Costa Rica-Instituto Tecnológico de Costa Rica

Croatia-Josip Juraj Strossmayer University Osijek

Denmark-Technical University of Denmark

Dominican Rep.-Pontificia Universidad Católica Madre y Maestra

Ecuador-Universidad Técnica Particular de Loja

Ecuador-Universidad de Cuenca

Germany-Mainz University of Applied Sciences

Greece-National Technical University of Athens

Greece-University of Patras

Hungary-Budapest University of Technology and Economics

Iceland-University of Iceland

Italy-Politecnico di Milano

Italy-Università degli studi della Basilicata

Italy-Universita' degli Studi di Messina

Italy-Politécnico di Bari

Italy-Università degli Studi "G. d'Annunzio" Chieti - Pescara

Italy-Università degli Studi di Catania

Italy-Università degli studi di Cagliari

Italy-Università degli Studi dell'Aquila

Italy-Università degli Studi di Napoli Federico II

Italy-Università di Bologna

Italy-Università degli studi di Cassino e del Lazio Meridionale

Italy-Pegaso Telematic University

Italy-Università degli Studi di Palermo

Italy-Università Roma Tre

Italy-Sapienza Università di Roma

Italy-Università degli Studi del Molise

Italy-Università del Salento

Italy-Università degli Studi di Salerno

Mexico-Universidad Nacional Autónoma de México

Mexico-Universidad Michoacana de San Nicolás de Hidalgo

Peru-Pontificia Universidad Católica del Perú

Peru-Univiversidad Nacional Pedro Ruiz Gallo

Peru-Universidad Nacional de San Martín

Paraguay-Universidad Nacional de Itapúa

Portugal-Universidade do Porto

Portugal-Instituto Politécnico de Bragança

Portugal-Instituto Superior Técnico | Universidade de Lisboa

Portugal-Universidade de Aveiro

Portugal-Universidade de Coimbra

Portugal-Instituto Politécnico de Viana do Castelo

Portugal-Universidade de Trás-os-Montes e Alto Douro

Portugal-Universidade do Minho

Portugal-Universidade da Beira Interior

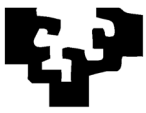
Portugal-Universidade Nova de Lisboa

Portugal-Instituto Politécnico de Viseu

Portugal-Universidade da Madeira

Portugal-Universidade Lusíada Porto

Serbia-University of Belgrade



Spain-Universidad del País Vasco

Spain-Universidad Politécnica de Madrid

Spain-Universidad de Sevilla

Spain-Universidad Politécnica de Valencia

Spain-Universidad de Oviedo

Spain-Universidad de Burgos

Spain-Universidad de Cantabria

Spain-Universidad de Granada

Spain-Universidad Politécnica de Cataluña

Spain-Universidad de Alicante

Spain-Universidad Complutense de Madrid

Spain-Universidad de Alcalá

Spain-Universidad Europea de Madrid

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Spain-Universidad de Valladolid

Spain-Universidad de Navarra

Spain-Universidad de Extremadura

Spain-Universidad de La Coruña

Spain-Universidad Internacional de Cataluña

Turkey-Istanbul Technical University

Turkey-Bahcesehir University

United Kingdom-Northumbria University

United Kingdom-University of the West of England

United States of America-University of Miami

United States of America-University of Illinois

United States of America-UC Berkeley

United States of America-Drexel University

Uruguay-Universidad de la República

ASSOCIATIONS, FOUNDATIONS & PUBLIC ENTITIES

Argentina-CeReDeTeC Centro Regional de Desarrollos Tecnológicos para la Construcción, Sismología e Ingeniería Sísmica

Argentina-LEMIT Laboratorio de Entrenamiento Multidisciplinario para la Investigación

México-Instituto de Ingeniería de la UNAM

Portugal-Laboratório Nacional de Engenharia Civil

Portugal-Instituto da Construção - UPorto

Portugal-ITECONS - UCoimbra

Portugal-Centre of Materials and Building Technologies C-MADE

Portugal-Institute for Sustainability and Innovation in Structural Engineering

Portugal-Centro de Estudos de Arquitectura e Urbanismo (CEAU-FAUP)

Portugal-Laboratório de Saúde na Edificação - UBI

Spain-Tecnalia Research & Innovation / Basque Research and Technology Alliance (BRTA)

Spain-Instituto de Ciencias de la Construcción Eduardo Torroja

Spain-Instituto Geológico y Minero de España

Spain-Diputación de Castellón - Servicio de Restauración

Spain-Fundación CETEMAS

Spain-Instituto Español del Cemento y Sus Aplicaciones

Spain-Valencia Institute of Building

Spain-Building Technology R&D Group - UC

Spain-Fundación Leonardo Torres Quevedo

Red Iberoamericana PROTERRA

SPONSOR & COLLABORATING ENTITIES

COMPANIES

REHABEND

ORGANIZING COMMITTEE

CONFERENCE CHAIRMEN:

- Prof. Dr. Ignacio Lombillo. University of Cantabria.
- Prof. Dr. Alfonso Lozano. University of Oviedo.

CONGRESS COORDINATORS:

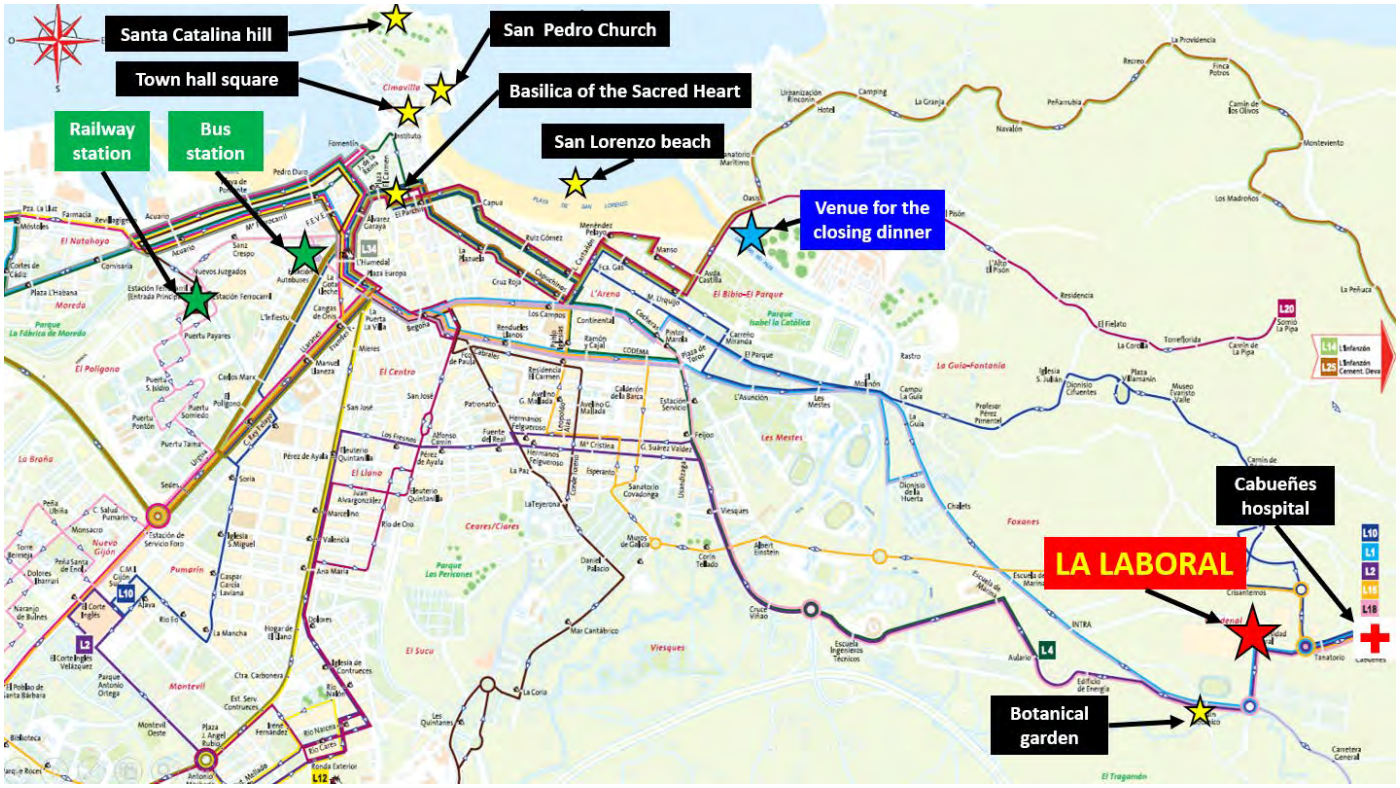
- Prof. Dr. Haydee Blanco. University of Cantabria.
- Dr. Yosbel Boffill. University of Cantabria.

CONGRESS ASSISTANS:

- Dr. Cesar Carrasco. University of Cantabria.
- Arch Bárbara Stork. University of Cantabria.
- Arch Verónica Chávez. University of Cantabria.
- Eng Julieta Faci. University of Cantabria.
- Eng Luis Tomás Silva. University of Oviedo.
- Eng Marcos Braña. University of Oviedo.
- Eng Diego Panizo. University of Oviedo.
- Eng student Miguel Álvarez. University of Oviedo.

1.- PREVIOUS STUDIES	1.1.- Multidisciplinary studies (historical, archaeological, etc.). 1.2.- Heritage and territory. 1.3.- Urban regeneration. 1.4.- Economical and financial policies. 1.5.- Social participation processes and socio-cultural aspects in rehabilitation projects. 1.6.- Construction pathology. 1.7.- Diagnostic techniques and structural assessment. 1.8.- Vulnerability studies and risk management. 1.9.- Guides and regulations.
2.- PROJECT	2.1.- Theoretical criteria of the intervention project. 2.2.- Traditional materials and construction methods. 2.3.- Novelty products applicable and new technologies. 2.4.- Sustainable design and energy efficiency.
3.- BUILDING INTERVENTION	3.1.- Intervention plans. 3.2.- Rehabilitation and durability. 3.3.- Reinforcement technologies. 3.4.- Restoration of artworks. 3.5.- Conservation of industrial heritage. 3.6.- Examples of intervention.
4.- MAINTENANCE	4.1.- Construction maintenance and infrastructures. 4.2.- Preventive conservation of built heritage.
5.- DIFFUSION AND PROMOTION	5.1.- Heritage and cultural tourism. 5.2.- Teaching and training. 5.3.- New technologies applied to the heritage diffusion. 5.4.- Accessibility to cultural heritage. 5.5.- Built heritage management.

The Congress venue is the architectural complex of *'Laboral Ciudad de la Cultura'*, located at *Luis Moya Blanco* Street, 261, zip code 33203 Gijón, Spain (Google maps: latitude 43.524128; longitude -5.613728). It is situated just a twenty-five-minute journey from the downtown by public transport.



General location of the Congress Venue (*Laboral Ciudad de la Cultura*) and other reference points in Gijon

The opening and closing sessions, the keynote lectures, the parallel sessions, the welcome reception, coffee breaks and lunchs will be develop in the Congress venue.

AIRPORT
***Asturias* Airport** Asturias Airport is located in the town of Castrillón, 40 km from Gijón.
https://www.aena.es/en/asturias.html
How to get to Asturias Airport by BUS: https://www.aena.es/en/asturias/getting-there/bus.html The transportation company ALSA provides services between the airport and the city of Gijón. Daily buses depart from the airport between 6:00 and 00:00, approximately every hour. For exact times, please refer to the ALSA website (https://www.alsa.com/en/web/bus/home) or call their information hotline at +34 902 422 242. Approximate fare: Around 10€ (one-way ticket). **CAR HIRE at Asturias Airport**: The main companies placed at the Asturias Airport are listed in the next link: https://www.aena.es/en/asturias/airport-services/car-hire.html

POSSIBLE WAYS TO ARRIVE AT GIJON FROM MADRID

RAILWAY (operated by Renfe)		
From	To	Approximate fare
'Madrid-Chamartín-Clara Campoamor' Station (Madrid) https://www.adif.es/w/17000-madrid-chamart%C3%ADn?pageFromPlid=335 *Agustin de Foxa* Street, zip code 28036, Madrid (Google maps: latitude 40.472054; longitude -3.682491)	**Gijon Railway Station** https://www.adif.es/w/15410-gij%C3%B3n-?pageFromPlid=335 *Sanz Crespo* Street, zip code 33207, Gijón (Google maps: latitude 43.537751; longitude -5.675677)	Around 50-70€ (one-way ticket)
BUS		
From	To	Approximate fare
South bus station 'Méndez Álvaro' (Madrid) https://estacionsurmadrid.avanzagrupo.com/ *Méndez Álvaro* Street, 83, zip code 28045, Madrid (Google maps: latitude 40.394840; longitude -3. 677882) There are also direct trips to Gijon from Madrid-Barajas T4 Airport	**Gijon bus station** https://www.alsa.com/en/web/bus/bus-stations/gijon-station *Magnus Blikstad* Street, 2, zip code 33207, Gijon (Google maps: latitude 43.538910; longitude -5.667261)	Around 20-30€ (one-way ticket)
CAR HIRE AT ADOLFO SUÁREZ MADRID-BARAJAS AIRPORT		
The main companies (placed at the airport 'Madrid-Barajas terminal 4') are listed in the next link: https://www.aena.es/en/adolfo-suarez-madrid-barajas/airport-services/car-hire/t4.html The main companies (placed at the airport 'Madrid-Barajas terminal T1') are listed in the next link: https://www.aena.es/en/adolfo-suarez-madrid-barajas/airport-services/car-hire/t1.html		

DIFFERENT WAYS TO GET TO 'LA LABORAL' FROM GIJON

TAXI
Two possible taxi companies in Gijón could be the following • Taxi Los Verdes (+34 985 164 444 / +34 985 162 222 / https://www.gijontaxi.es/) • Radio Taxi Gijón (+34 985 141 111 / https://radiotaxigijon.info/). Typical taxi fares from Gijón to La Laboral are around 12-18€ (one-way) for your reference
URBAN TRANSPORT
The Municipal Transport Company of Gijón (EMTUSA) has regular bus lines that include a stop at Universidad Laboral in their route: • **Line 1**: El Cerilleru-Hospital de Cabueñes. Cabueñes. https://documentos.gijon.es/doc/LineasBus/l1.pdf • **Line 2**: El Corte Inglés-Hospital de Cabueñes. https://documentos.gijon.es/doc/LineasBus/l2.pdf • **Line 18**: Nuevo Gijón-Hospital de Cabueñes. https://documentos.gijon.es/doc/LineasBus/l18.pdf • **Line E71** (express line): Gran Capitán - Hospital De Cabueñes https://documentos.gijon.es/doc/LineasBus/l71.pdf +info: https://www.gijon.es/es/directorio/emtusa-empresa-municipal-de-transportes-urbanos-sa https://www.gijon.es/es/bus_lineas
+INFO
http://www.laboralciudaddelacultura.com/en/6/visitas/12/cmo-llegar.html

Day / Hour	Tuesday May 7th	Wednesday May 8th	Thursday May 9th	Friday May 10th
8h30	DOCUMENTATION DELIVERY	PARALLEL SESSIONS	PARALLEL SESSIONS	
9h00	PARALLEL SESSIONS			POST-CONGRESS TRIP (optional)
9h30				
10h00	COFFEE BREAK	COFFEE BREAK	COFFEE BREAK	
10h30	KEYNOTE SESSIONS 1 & 2	KEYNOTE SESSIONS 3 & 4	KEYNOTE SESSIONS 5 & 6	
11h00				
11h30	BREAK	BREAK	BREAK	
12h00	OPENING	LUNCH	PARALLEL SESSIONS	
12h30				
13h00				
13h30	LUNCH	BREAK	LUNCH	DISCOVER THE ASTURIAN ESSENCE: COVADONGA, LASTRES, AND THE SECRET OF CIDER ON AN UNFORGETTABLE JOURNEY
14h00		IMPORTANT Buses departures: 14:15h		
14h30				
15h00	PARALLEL SESSIONS	TECHNICAL - CULTURAL TRIP	PARALLEL SESSIONS	
15h30				
16h00				
16h30	COFFEE BREAK		COFFEE BREAK	
17h00	PARALLEL SESSIONS	DISCOVERING THE MAGIC OF OVIEDO: BETWEEN HISTORY, ARCHITECTURE, AND TRADITION	PARALLEL SESSIONS	
17h30				
18h00			CLOSING	
18h30				
19h00				
19h30	WELCOME RECEPTION at *Universidad Laboral of Gijon*			
20h00				
20h30				
21h00			CLOSING DINNER at NH**** Hotel of Gijon	

KEYNOTE SPEAKERS

Congress REHABEND 2024 on

CONSTRUCTION PATHOLOGY, REHABILITATION TECHNOLOGY AND HERITAGE MANAGEMENT

Gijón, Spain, September 7th-10th, 2024

	HOUR	INSTITUTION	SPEAKER	TITLE
07/05/2024	10h30 - 11h05	UNIVERSITY OF BASILICATA (ITALY)	PROF. DR. ANTONELLA GUIDA	Innovative architectural heritage management process: digital tools for maintenance and durability monitoring. The Sassi of Matera (Italy) between history and contemporaneity
	11h10 - 11h45	UNIVERSITY OF A CORUÑA (SPAIN)	PROF. DR. MARIO CRECENTE	Master Plan of the El Pasatiempo Park
08/05/2024	10h30 - 11h05	UNIVERSITY OF ALICANT (SPAIN)	PROF. DR. SALVADOR IVORRA	Seismic behavior of masonry walls reinforced with fiber-reinforced mortar (TRM)
	11h10 - 11h45	UNIVERSITY OF MINHO (PORTUGAL)	PROF. DR. DANIEL V. OLIVEIRA	Structural performance and strengthening of earthen constructions
09/05/2024	10h30 - 11h05	UNIVERSITY OF MESSINA (ITALY)	PROF. DR. ANTONINO RECUPERO	Riccardo Morandi, a futurist and visionary Italian engineer
	11h10 - 11h45	UNIVERSITY OF AVEIRO (PORTUGAL)	PROF. DR. HUGO RODRIGUES	Characterization of historical construction: the development of digital tools to preserve cultural heritage – Application on the Batalha Monastery

KEYNOTE SESSION nº 1: May 7th, 2024, 10h30-11h05 (Conference Room 1)

PROF. DR. ANTONELLA GUIDA

Architect and Full Professor - SSD ICAR 10 Building Technology and Design, University of Basilicata (USB). Head of School of Architecture of Matera since 2014 until 2022 and Member of the CUIA-Italian University Conference of Architecture. Subdirector of DiCEM - Department of European and Mediterranean Culture: Architecture, Environment and Cultural Heritage. Coordinator for international mobility of DiCEM since 2016. Coordinator of PhD Course 'Cities and landscapes: architecture, archaeology, cultural heritage, history and resources', Matera (Italy). Member of several competition commissions in various Italian universities and Research centers.

Associate of CNR-ISPC Institute for Cultural Heritage Sciences since 2015 (Institute of Heritage Science). She is a member of the Superior Council of Public Works for the three-year period 2020-2023. Member of the Board and Treasurer of ArTec (Italian Scientific Association of Technical Architecture). Member of the Scientific Council of the Italian Institute of Castles. She was a councilor as a technical expert for the Municipality of Matera 2007/2009

Vice President and Member of the Board of *'Basilicata Creativa'*, Cluster of Cultural and Creative Industries-Smart Specialization Strategy of Basilicata (S3). He was President of the academic 'SPIN OFF' *'Casa Mediterranea'*.

The scientific interest is oriented to the technical and technological aspects of the building, inducing the impact on the formal aspects at the different scales of the urban and construction process. The most investigated area of research is the recovery of the existing building, cultural and industrial heritage. She was responsible for numerous research grants and agreements with public and private bodies. Her scientific production consists of over 200 papers published in various national and international journals, books and conference proceedings. Editor and reviewer of national and international scientific journals. Member of scientific committees and reviewer of Class A journals in the CUN 08 area.

On a professional level, she carries out consultancy work on the rehabilitation of settlements in areas and monuments of historical value, the application of innovative technologies, and the environmental-architectural enhancement and redevelopment of historical centers. She is scientific, architectural and technical consultant in numerous restoration works, conservative restoration in the Sassi of Matera, to be adapted to public and accommodation facilities.

INNOVATIVE ARCHITECTURAL HERITAGE MANAGEMENT PROCESS: DIGITAL TOOLS FOR MAINTENANCE AND DURABILITY MONITORING. THE SASSI OF MATERA (ITALY) BETWEEN HISTORY AND CONTEMPORANEITY

ABSTRACT: The research activity is connected to the Ecosystem of Innovation Project "Tech4You - Technologies for climate change adaptation and quality of life improvement", Technologies for resilient and accessible cultural and natural heritage and the aim is develop the possibility of governing advanced representation systems of architectural artefacts as a tool for controlling the design process and management, knowledge and implementation.

The research start form a thorough knowledge of the existing architecture through the study and analysis of archival sources, as well as the Direct survey, and the decomposition of typological elements characterizing the historic buildings of a UNESCO heritage site, the Sassi of Matera, where the variability and uniqueness of the built environment par excellence is encountered, mostly subject to protection.

The Sassi of Matera (Italy)

HeMaIn™ technology platform

KEYNOTE SESSION nº 2: May 7th, 2024, 11h10-11h45 (Conference Room 1)

PROF. DR. MARIO CRECENTE

Mario Crecente is Ph.D. Architect, Tourism and Heritage consultant and professor in Tourism Management of Heritage in the University of A Coruña.

His first experience as architect in the public sector was working for the Galicia´s regional government, in the areas of Heritage, Urban Planning, and Tourism from 1985 to the year 2000.

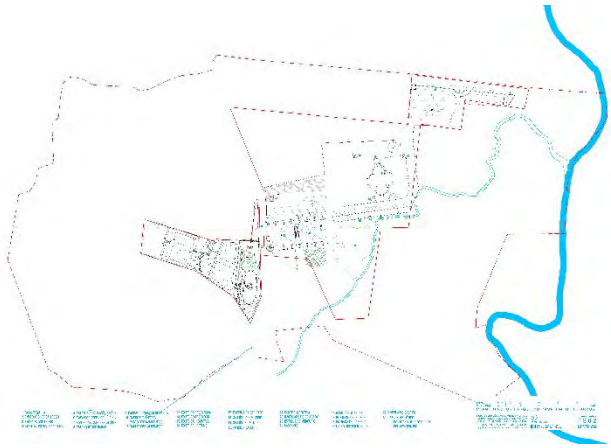
In 2000 he created Crecente Asociados, to work in the relations of Heritage and Tourism from an architectural perspective. We work at different scales, from Consulting, Planning and Project Design, that are developed in different phases until the execution and site management.

MASTER PLAN OF THE EL PASATIEMPO PARK

ABSTRACT: At the request of the Galician Ministry of Culture, Education, Vocational Training and Universities of the Xunta de Galicia, Crecente Asociados developed the Master Plan of the El Pasatiempo Park (Betanzos - A Coruña – Galicia - Spain), declared an Asset of Cultural Interest in 2020. El Pasatiempo is a compendium of artistic disciplines with samples of architecture from which we can highlight the systems of caves and ponds. It can be considered a representative work of the creative genius of its promoter, Juan María García Naveira, who provides us with a manifesto of his values. It is a representative example of the Galician philanthropic tradition and, specifically, of that developed by the Indianos after their return from America at the end of the 19th century and beginning of the 20th.

The execution of the Master Plan is the result of a 15-month work of a multidisciplinary team made up of 18 specialists from the fields of architecture, history, hydraulic engineering, restoration, archaeology, botany, landscape, geomatics, tourism and informatics.

After gathering all the available knowledge about the Park, through an intense process of investigation, inventory and analysis of pathologies, supported by tests for the study of materials and construction systems, the Master Plan defines the current state of the monument and develops proposals for its maintenance, conservation, enhancement and use. The intervention program, with a 15-year calendar, is structured into 5 lines of action: restoration and recovery, access and accessibility, gardening and landscape, installations and social, cultural and tourist equipment.



Overlay of the current and original Park

One of the caves of El Pasatiempo

KEYNOTE SESSION nº 3: May 8th, 2024, 10h30-11h05 (Conference Room 1)

PROF. DR. SALVADOR IVORRA

University Professor in the Area of Mechanics of Continuous Media and Theory of Structures of the Department of Civil Engineering of the University of Alicante. He has been a professor at the Polytechnic University of Valencia and Visiting professor at the Universities of Bristol (UK) and the Polytechnic of Bari (Italy). His research activity has focused on the dynamic behavior of structures and structural reinforcement, having dedicated an important part of his research to structures that are part of the historical heritage.

He is the author of 85 scientific articles, 72 of them in journals indexed in JCR, more than 120 conference papers, several of them invited. He has been director of 17 Doctoral Theses. He participates as a reviewer in more than 22 high-impact JCR journals.

He has participated in 32 competitive research projects, in 17 as principal investigator, and in more than 150 research and assistance contracts. He has been responsible for coordinating the project financed by €2m in FEDER Funds for the Construction of the Civil Engineering Research Laboratory of the University of Alicante. He is co-inventor of two Spanish patents.

He has received several awards for his research and professional activity, highlighting the nomination by the *fib* of the Kiss Bridge pedestrian walkway, of which he is co-author, for the best Concrete Work in the four-year period 2009-2014 (Collected in Mumbai, India). The prize of the Association of Structural Consultants (2019) for the intervention project in the "La Paz" masonry chimney, and the Bristol Benjamin Meaker Distinguished Visiting Professor (2020) award at the University of Bristol (UK), among others.

SEISMIC BEHAVIOR OF MASONRY WALLS REINFORCED WITH FIBER-REINFORCED MORTAR (TRM)

ABSTRACT: Mortars reinforced with fiberglass meshesh, carbon or other materials have begun to be used to reinforce masonry structures. This work shows some numerical and experimental studies developed to analyze the behavior of these structures both against cyclical loads in their plane and under fire conditions. This work shows the results obtained in the laboratory tests both in specimens under diagonal compression and in 3x2 m walls. In the study, the evolution of the bonding of the reinforcing mesh has been analyzed before and after damage, both due to mechanical and thermal origin.

The conclusions value the significant increase in ductility of these reinforced structures against horizontal action even after being damaged and subsequently reinforced. The conclusions of the study have been applied to retrofit several industrial brick factory chimneys against seismic loads.

Laboratory test on brickwork reinforced with TRM

Test on several brick masonries reinforced with TRM on one or both faces

KEYNOTE SESSION nº 4: May 8th, 2024, 11h10-11h45 (Conference Room 1)

PROF. DR. DANIEL V. OLIVEIRA

Daniel Oliveira is Associate Professor at the University of Minho, Portugal.

His main research interests are related to the experimental and numerical analysis of traditional and heritage masonry structures, earthquake engineering, repair and strengthening of masonry, earthen construction, vernacular stone heritage, risk analysis and durability.

He has been involved in more than 40 research projects in the field of masonry, funded on a competitive basis.

He supervised 5 post-Doc students, 30 PhD students and 90 MSc students, from Portuguese and international universities.He is the author of more than 300 technical and scientific publications about masonry, currently holding a Scopus h-index of 40.

Daniel Oliveira is Deputy Coordinator of the international Master course in Structural Analysis of Monuments and Historical Constructions (SAHC, www.msc-sahc.org), coordinated by University of Minho and funded by the European Commission as Erasmus Mundus Master Course for a period of 10 consecutive years, award winner of the “EU Prize for Cultural Heritage / Europa Nostra Awards 2017”.

STRUCTURAL PERFORMANCE AND STRENGTHENING OF EARTHEN CONSTRUCTIONS

ABSTRACT: The widespread and historic use of earthen constructions can be attributed to the local availability of raw materials, sustainability of the building process, and low cost.

Despite their countless advantages, Earthen structures are prone to earthquakes, mainly due to the low strength of the material, high inertial forces, and lack of engineering approaches in design and building. In spite of the extensive use of earthen structures, the structural behaviour of such buildings is still not well known, particularly concerning their cyclic in-plane and out-of-plane response, thus requiring the study of strengthening solutions able to reduce seismic vulnerability.

In this context, this lecture starts by presenting the main features associated with the structural behaviour of earthen constructions, highlighting their advantages and weaknesses. Then, a series of recent experimental campaigns on the static and dynamic behaviour of adobe vaults and rammed earth, carried out at the University of Minho, is presented and discussed. These experimental research works considered the performance of both unstrengthened and strengthened specimens. Particular emphasis is given to shake table tests carried out on a full-scale rammed earth subassemblage.

Adobe vault

Rammed earth wall

Rammed earth subassemblage

KEYNOTE SESSION nº 5: May 9th, 2024, 10h30-11h05 (Conference Room 1)

PROF. DR. ANTONINO RECUPERO

Full Professor of Structural Engineering at the University of Messina, Department of Engineering. He obtained his PhD degree in Structural Engineering from the Technical University of Turin in 1997, under the guidance of Professor G. Mancini. His doctoral dissertation focused on the non-linear behavior of reinforced concrete bridge structures.

Since 2005, he has been a professor of structural and bridge engineering at the Department of Engineering, where he has supervised numerous undergraduate and doctoral theses. Since 2013, he has been a member of the PhD College - University of Messina, specializing in 'Engineering and Chemistry of Materials and Construction'.

His primary research interests include retrofitting existing PC and RC bridges using historical and innovative materials and systems, seismic vulnerability of existing bridges, and the study of fatigue stresses in the end zones of bridge stays induced by wind vibrations.

He serves as the Scientific Director of several Research Units at the University of Messina. Currently, he is a member of FIB (International Federation for Structural Concrete), ACHE (Asociación Científico-Técnica del Hormigón Estructural), ANIDIS (Italian Association of Seismic Engineering), AICAP (Italian Association of Reinforced and Prestressed Concrete), and C.T.E. (Collegio dei Tecnici della Industrializzazione Edilizia).

Additionally, he is affiliated with the research group led by Professor Hugo Corres Peiretti at the Civil Engineering School of the Polytechnic University of Madrid, focusing on the effects of deformations on ordinary and prestressed reinforced concrete structures. He has also worked as a Visiting Researcher at the 'Departamento de Ingenierìa de la Costrucciòn' of the Civil Engineering School at the Polytechnic University of Barcelona, under the supervision of Professor Toni Marì Bernat.

Currently, he serves as an External Expert in the Ministry of Infrastructure and Transport, an Expert Member of the C.T.A. of the Interregional Provveditorato per le Opere Pubbliche Sicilia e Calabria and C.S.LL.PP, and a Member of the Commission for the management and monitoring of the experimentation provided for in paragraph 4 of Article 49 of Legislative Decree no. 76 of 16/07/2020.

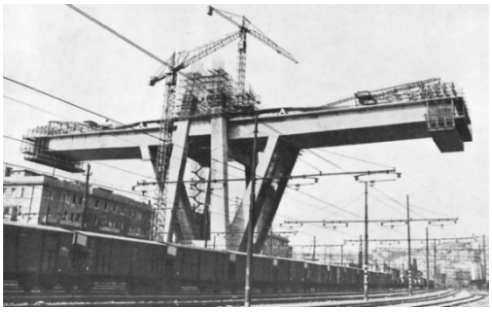
RICCARDO MORANDI, A FUTURIST AND VISIONARY ITALIAN ENGINEER

ABSTRACT: During the post-World War II period, Italy witnessed the establishment of a strong School of Structural Engineering. With much of the country's infrastructure destroyed during the war, Italian engineers were tasked with their reconstruction, supported economically by the United States through initiatives like the Marshall Plan, also known as the European Recovery Program.

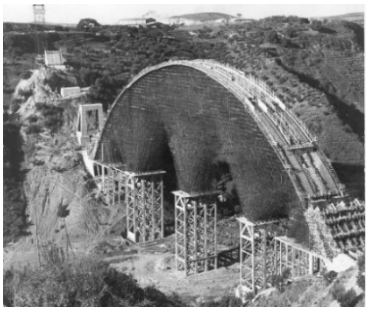
This era provided Italian structural engineers with significant opportunities to showcase their skills. Many engineers emerged with daring and visionary solutions, and one notable figure among them was Riccardo Morandi.

Riccardo Morandi (September 1st, 1902 - December 25th, 1989), was an Italian civil engineer renowned for his innovative use of reinforced concrete and prestressed concrete in building and bridge construction.

One of Morandi's most significant contributions was the development of the homogenized cable-stayed bridge. He applied this design concept to various notable projects, including the General Rafael Urdaneta Bridge, a cable-stayed bridge spanning Lake Maracaibo in Venezuela, and the Wadi el Kuf Bridge, located 20 km west of Bayda, Libya, which stands as the second-highest bridge in Africa. Another prominent example of Morandi's work is the bridge in Genoa, commonly referred to as Ponte Morandi (officially known as Polcevera viaduct), which tragically experienced a partial collapse in 2018, with the causes still under investigation. In the 1990s, the Polcevera viaduct underwent a significant but incomplete retrofitting process. This keynote presentation aims to highlight the characteristics of this structural typology, along with the critical issues associated with it.



Polcevera viaduct, Genoa, Italy



Bisantis bridge, Catanzaro, Italy

KEYNOTE SESSION nº 6: May 9th, 2024, 11h10-11h45 (Conference Room 1)

PROF. DR. HUGO RODRIGUES

Hugo Rodrigues is Associate Professor at University of Aveiro, within the Department of Civil Engineering, since 2020.

He is the Director of the Master in Master in Built Heritage Conservation, where he carries out his activities as lecturer, researcher and consultant.

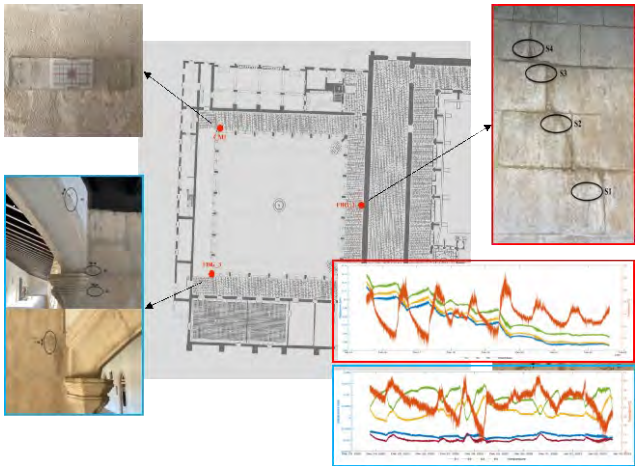
His experience in Seismic analysis, having coordinated and participated in research and applied research projects and also in specialized consultancy studies ordered by several public institutions and companies regarding the assessment of seismic risk.

Over the last decade, he has been researching the field of Building Rehabilitation, Structural Health Monitoring, and Seismic Safety, including experimental and numerical activities.

He is the Coordinator of the College of Civil Engineering from Central Regional the of the Portuguese Engineers Association.

CHARACTERIZATION OF HISTORICAL CONSTRUCTION: THE DEVELOPMENT OF DIGITAL TOOLS TO PRESERVE CULTURAL HERITAGE – APPLICATION ON THE BATALHA MONASTERY

ABSTRACT: The development of adequate analyses for monuments and historical structures represents an important task, not only to verify their structural behavior, but also to understand the observed damages, estimate their performance deterioration, and, if needed, properly design effective repair interventions. The analysis of historical structures is challenging and requires the use of complex numerical models in terms of geometry, material properties, and accurate damage representation, depending on the current state of the structure. This work focuses on the Monastery of Batalha as a case study and shows the framework developed to represent the monument globally, including the results from several non-destructive techniques for the characterization and monitoring of the building, damage classification through the development of an innovative inspection method based on image acquisition, and implementation of an SHM system based on different sensing techniques. A first approach regarding the SHM system was the implementation of fiber optic sensors, namely the Fiber Bragg gratings (FBG) solution, which allows the monitoring of several parameters of the structures with high accuracy and minimal intrusion. The FBG sensors rely on the analysis of the reflected optical spectrum by the Bragg gratings, so as the fiber conditions (temperature, length, pressure, etc.) change, there is a proportional spectral shift in the reflected Bragg wavelength. The numerical models are paired with an SHM system implemented in the monastery to update the model, allowing the development of a live digital twin. Finally, solutions for the recovery of lost or damaged elements are presented, using digital technologies for the collection of volumetric and dimensional information, specifically developed for the recovery and conservation of the built elements.



	Tuesday May 7th	Wednesday May 8th	Thursday May 9th	Friday May 10th
Morning	Companions: **Free Time** (shopping, etc.)	Companions: **Free Time** (shopping, etc.)	**9h00 – 13h00** Trip (only for the companions) **Exploring the charms of Aviles**	**9h00 – 20h00** **Post-congress Trip** **Discover the Asturian essence: Covadonga, Lastres, and the Secret of Cider on an unforgettable journey** (Optional)
Afternoon / Evening	**19h30** **Welcome reception at *Universidad Laboral* of Gijon – The 'ideal city' by Architect Luis Moya**	**14h00 – 20h15** **Technical–Cultural trip** **Discovering the magic of Oviedo: between history, architecture, and tradition** **(including UNESCO World Heritage Sites)** **IMPORTANT Buses departures: 14:15h**	**21h00** **Closing Dinner at NH hotel of Gijon**	

Tuesday, May 7th
Welcome reception at *Universidad Laboral of Gijon* – The 'ideal city' by Architect Luis Moya
For Delegates, Students and Companions

On the first day of the congress, along with a **guided tour** of the architectural complex of *Universidad Laboral* of Gijon, Fig. 1, a **welcome cocktail** will be offered to the attendees starting at **19:30 h**.

Originally conceived as a mining orphanage and transformed during its construction into the *Universidad Laboral*, the building designed by architect Luis Moya was envisioned as a self-sufficient and self-contained ideal city. It even included a 100-hectare farm and was equipped to educate generations of workers' children into highly skilled professionals.


Fig. 1: The *Universidad Laboral* of Gijon.

Built according to the ideals of classical architecture, the centerpiece of this ideal city would be the grand central square, around which the magnificent Church, the Tower, the Theater, and the administrative buildings are arranged. Around this monumental heart of the city, the rest of the facilities unfold, among which the spacious halls constructed for vocational training workshops stand out, as shown in Fig. 2.

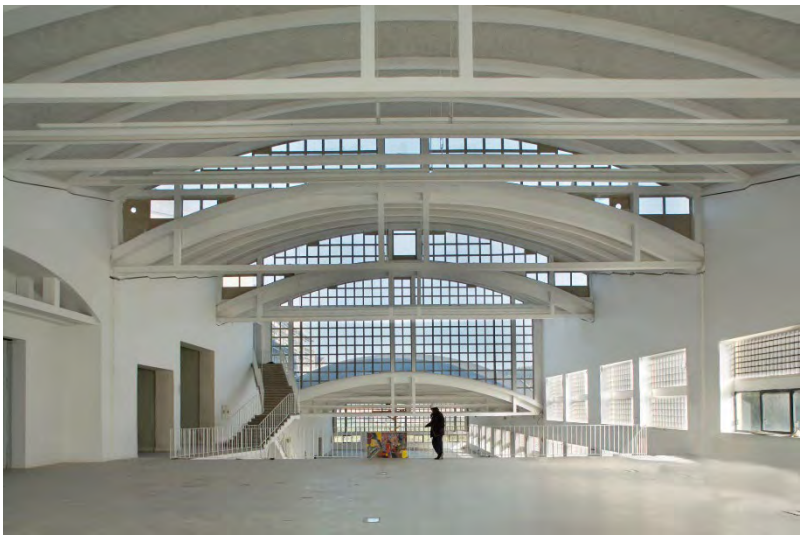



Fig. 2: Halls constructed for vocational training workshops.

A BRIEF HISTORICAL OVERVIEW

The complex of buildings began construction in 1948, and the works continued for years until abruptly halted in 1957, following the sudden dismissal of the Minister of Labor, José Antonio

Girón, the main driving force behind the Spanish labor universities. By then, the first students were already attending classes at the institution in Gijón. In the 1980s, the *Universidad Laboral* became part of the National Institute of Integrated Education. Finally, in 2001, the Government of the Principality of Asturias took over the building and began designing an ambitious plan to breathe new life into the architectural complex. It was then conceived to overlay a new idea of a city onto Moya's ideal city, creating a center for cultural and creative production of the 21st century.

The renovation works began in 2005, giving rise to an art center created from some of the vocational training halls; a newly constructed studio, now housing the *Radiotelevisión* of the Principality of Asturias (RTPA); a spectacular library; the Corinthian atrium; the magnificent Auditorium, and thousands of square meters rehabilitated to accommodate various educational and cultural uses.

THE BUILDING

The building is constructed with its back to the city of Gijón. Luis Moya designed it in such a way that to access its interior, one would have to walk around it to appreciate it in all its magnificence. It follows the guidelines of the neo-Herrerian and neoclassical styles, characteristic of Francoist architecture. Among the most notable spaces are the following:

Corinthian atrium and central courtyard. Located behind the tower-gate, a rectangular courtyard opens in the manner of a Corinthian atrium, with granite columns, each ten and a half meters high, defining a warmly welcoming space thanks to a new glass roof, Fig. 3. After passing through the atrium, you access the central courtyard, which becomes a focal point leading towards the tower and the church, Fig. 4.

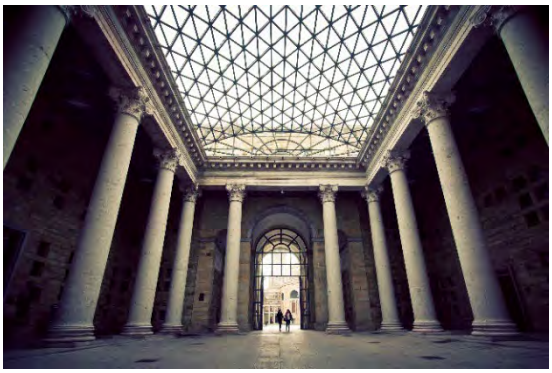


Fig. 3: Corinthian atrium.

Fig. 4: Central courtyard.

The **Church** is undoubtedly the most spectacular building in the architectural complex. With a surface area of around 900 m^2, it is one of the largest elliptical-plan churches in the world, as shown in Fig. 5.

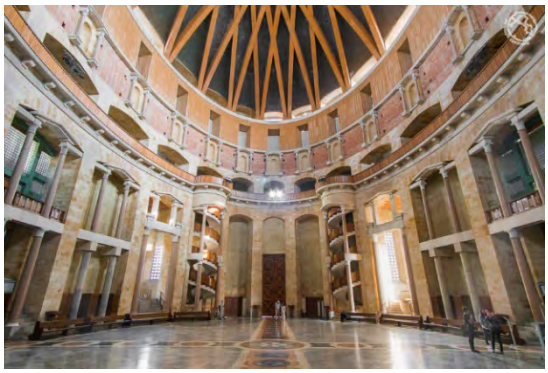


Fig. 5: Elliptical-plan Church of the *Universidad Laboral*.

The interior is covered by a dome with an estimated weight of 2300 tons, mounted on 40 intersecting brick ribs that support the structure, as shown in Fig. 6 and 7. The height from the ground to the beginning of the dome's arches is 25 meters, and it reaches 33 meters to the center of the oculus.

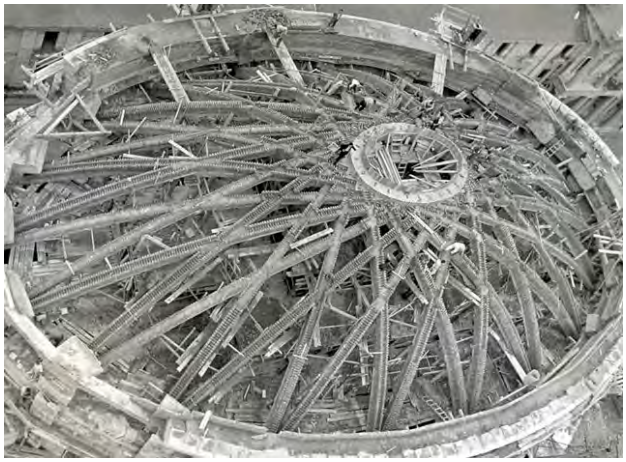


Fig. 6: Photograph taken during the construction of the dome.

Fig. 7: Elliptical dome.

The **Tower** is perhaps the most characteristic building of the Laboral, as it is the one that helps identify the City of Culture upon first visit. With a height of 130 meters, it is the tallest building in the Principality of Asturias, surpassing the tower of the Cathedral of Oviedo, and the tallest stone building in Spain, as shown in Fig. 8. On the seventeenth floor, there is an observation deck that offers a fantastic view of the Laboral complex, as well as the green and blue landscape surrounding the building, as depicted in Fig. 9. Attendees will have the opportunity to enjoy these views throughout the event.

Fig. 8: The Tower of the *Universidad Laboral*. Tallest stone building in Spain with 130 meters.

Fig. 9: The views from the observation deck of the tower are marvelous.

The **Theater** features a Hellenistic-style facade with dimensions similar to those of the Parthenon, as shown in Fig. 10. Originally conceived as a large auditorium for students and professors of the former *Universidad Laboral*, the venue has become one of the best in northern Spain in terms of space, capacity, and technology. It accommodates around 1500 seats distributed in the main hall, the boxes, and the amphitheater, as seen in Fig. 11. Additionally, there are seats in the rehearsal rooms, meeting rooms, and conference halls, increasing the seating capacity to 2000 spectators.

It was the first fully air-conditioned theater in Europe, featuring a revolutionary underground air distribution system. The front of the stage was adorned with a fresco measuring one hundred and twenty square meters titled ‘Allegory of the Arts and Crafts’, created by the Andalusian painter Enrique Segura. Unfortunately, this fresco is no longer visible today.

Fig. 10: Main entrance to the theater from the central courtyard.

Fig. 11: Interior perspective of the theater.

Special mention also goes to the **Painting Room** (*Sala de Pinturas*), where the congress welcome reception is planned to be held, as shown in Fig. 12. This space is located on the second floor of the theater, adorned with frescoes also by Enrique Segura, and has access to the balcony overlooking the central courtyard.

Fig. 12: Painting Room (Sala de Pinturas), the space where the welcome reception will be offered.

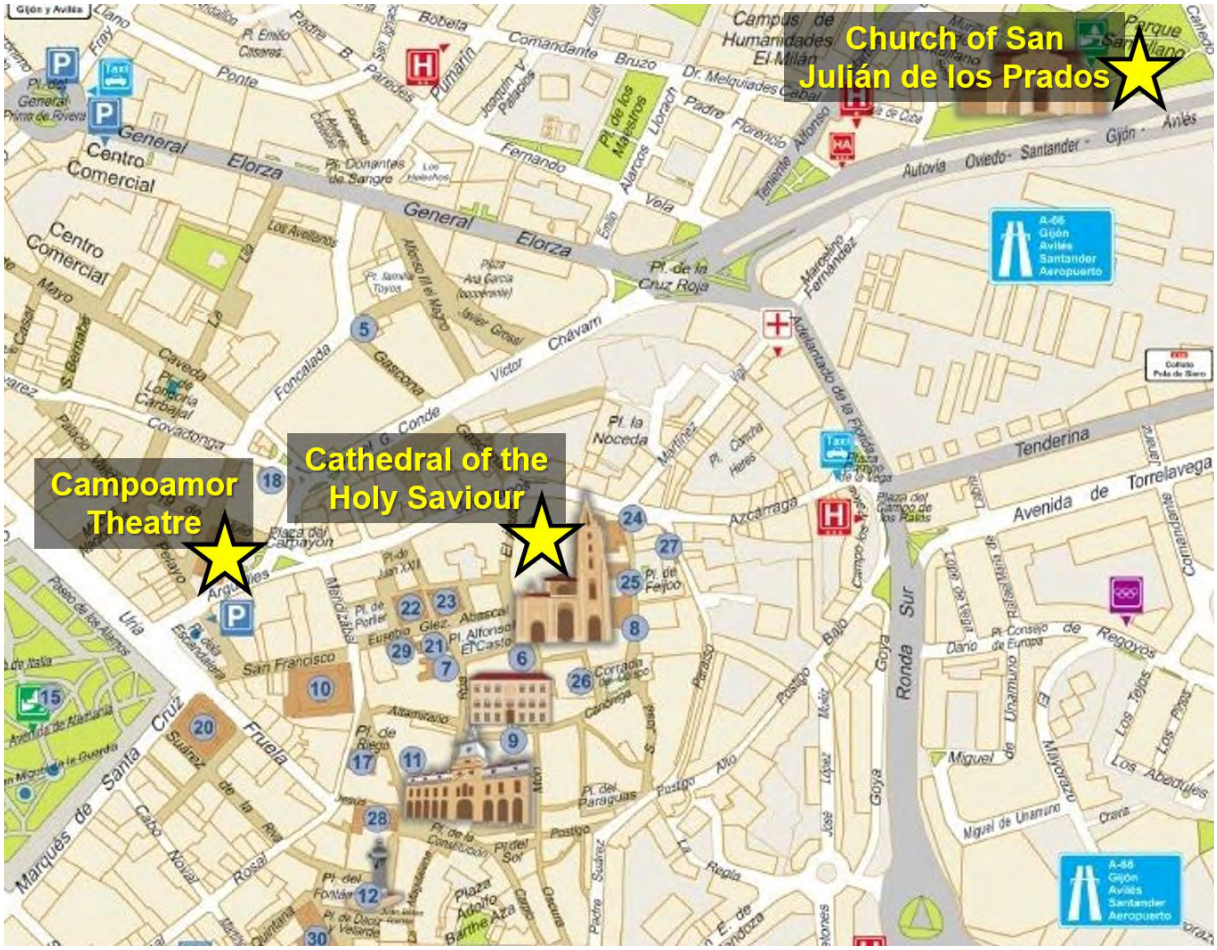
Wednesday, May 8th
Discovering the Magic of Oviedo: Between History, Architecture, and Tradition
For Delegates (full inscriptions, not student inscriptions) and Companions

14:15h Departure from the congress venue (Universidad Laboral de Gijón)

15:30h Beginning of the technical-cultural visit

Oviedo is a key city not only to understand the history of Asturias but also of Spain. Thus, it is worth mentioning its Pre-Romanesque Art, a UNESCO World Heritage, which opens the doors to our past; its Cathedral of San Salvador and the Holy Chamber, with relics that amazed the legendary Cid Campeador; and its image as a stately capital acquired, since the Industrial Revolution, thanks to Jovellanos.

It is a city that captivated the writer Leopoldo Alas Clarín and Woody Allen, and served as the setting for the second most-read novel in Spain after Don Quixote, '*La Regenta*'.



Map of downtown Oviedo

CATHEDRAL OF THE HOLY SAVIOUR ('SAN SALVADOR')

The Cathedral of San Salvador of Oviedo is one of the most important cathedral complexes in Spain, with over 1200 years of history, having witnessed the evolution of the Christian kingdoms in the northern Iberian Peninsula during the Middle Ages, Fig. 1. It is also known as *Sancta Ovetensis*, referring to the quality and quantity of the relics it contains.

The church is located on the site of the former pre-Romanesque cathedral complex from the 9th century, some of whose buildings have survived. The Gothic structure began construction at

the end of the 13th century with the chapter house and the cloister, and its construction continued for three centuries until the completion of the tower in the mid-16th century. A ambulatory was added in the 17th century, along with various chapels attached to the side aisles. Therefore, the architectural complex contains structures of pre-Romanesque style (Holy Chamber of Oviedo), Romanesque (vaults and apostolate of the Holy Chamber), Gothic (major part of the cathedral, chapter house, and cloister), Renaissance (completion of the tower), and Baroque (ambulatory, Chapel of King Alfonso II 'the Chaste', and other chapels).

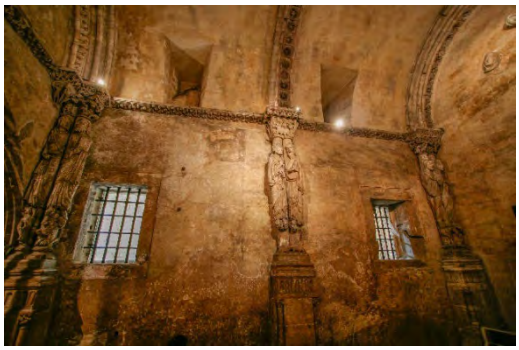
Fig. 1: View of the Oviedo Cathedral from Alfonso II 'the Chaste' Square.

The Asturian king Fruela I ordered the construction of a basilica dedicated to San Salvador on the grounds where the current Cathedral of Oviedo stands. This basilica was looted and destroyed during a Muslim raid in 794. Subsequently, King Alfonso II commissioned the construction of an entire architectural complex on the same grounds, utilizing some spaces of the old church of San Salvador. A defensive wall, the bishop's residence, and other episcopal dependencies were erected, along with a group of churches consisting of various religious buildings, namely: the monasteries of San Vincente and later San Juan Bautista and San Pelayo. The main focus was on the basilicas of San Salvador and Santa María, the latter standing until the 18th century, adjacent to the former as a cemetery space. The Basilica of San Salvador was consecrated on October 13, 821. It was a three-naved building with a rectangular triple apse and a wooden roof.

In the early 9th century, in connection with the reconstruction work of the basilica dedicated to San Salvador, Alfonso II ordered the construction of the Holy Chamber of Oviedo, recognized as a World Heritage Site by UNESCO, Fig. 2(a). This space has housed the Treasures and Relics of the Cathedral since then. Among them, the crosses of Victory and the Angels are noteworthy, symbols of Asturias and the city of Oviedo, respectively, Fig. 2(b), as well as the Agate Box and the Holy Ark containing a large number of relics, including, according to tradition, the Holy Shroud of Christ, Fig. 2(c). These relics are of such importance that the Oviedo Cathedral became a major attraction for pilgrims since the Middle Ages, establishing itself as a pilgrimage route known as the Way of San Salvador alongside the Way of Saint James (*Camino de Santiago*). Thus, it is often said '*Who goes to Santiago and not to San Salvador, visits the pupil and not the Master*'.

At the end of the 11th century, the Old Tower complemented its defensive function with that of a bell tower, receiving for this purpose a Romanesque structure. More importantly, the reform carried out in the Holy Chamber at the end of the 12th century was significant. The old wooden

roof was dismantled to subsequently construct a barrel vault that rests on columns featuring a sculpted Apostolate, a masterpiece of Spanish Romanesque, Fig. 2(d).



(a)

(c) (c) (d)

Fig. 2: Holy Chamber of the Oviedo Cathedral. (b) Crosses of Victory and of the Angels. (c) Holy Shroud of Christ. (d) Detail of columns with sculpted Apostolate.

The influence of Gothic architecture reached Asturias at the end of the 13th century when the Gothic renovation of the cathedral complex began. However, it did not start with the main building but with annexed structures: the chapter house, Fig. 3, and the cloister, Fig. 4.

Fig. 3: Chapter house.

Fig. 4: Cloister.

It would take almost another century to see the beginning of the Gothic cathedral. In the 16th century, the portico and the tower of the facade were completed. This is what we can contemplate in the current cathedral, Fig. 5. In the following centuries, works and improvements were carried out in many of the chapels.

On October 11, 1934, during the convent burnings of the Asturian Revolution, a group of Marxist revolutionaries detonated a bomb in the crypt of the Holy Chamber, which devastated a significant part of the monument and caused serious damage to its structure. The artwork also suffered extensive damage, and important relics were lost. Nevertheless, significant treasures, such as the Holy Shroud, were rescued from the debris of the crypt. The reconstruction of this

disaster took place between 1939 and 1942, aiming to respect and reconstruct the structure as faithfully as possible to the original.

Fig. 5: The exteriors and interiors of Oviedo Cathedral.

PRE-ROMANESQUE CHURCH OF SAN JULIÁN DE LOS PRADOS

The Church of San Julián de los Prados, Fig. 6, also known as '*Santullano*' of Oviedo, was built during the reign of Alfonso II the Chaste (791-842), dedicated to the Holy Martyrs Julián and Basilisa. It was declared Historic Artistic Monument in 1917 and World Heritage Site in 1998.

Fig. 6: Overview of the Pre-Romanesque Church of San Julián de los Prados, Oviedo.

The beauty of its architecture is noteworthy. It features a Latin basilica floor plan with three aisles, a transept formed by a large transversal nave, a tripartite head with three square chapels covered with barrel vaults, a portico at the entrance, and lateral rooms, Fig. 7(a).

Inside, the aisles are separated by semicircular arches supported by square pillars. The central nave is separated from the transept by an arch, on either side of which there are two openings with stone arches, Fig. 7(b). The aisles and transept are covered with wooden framing, while the chapels use barrel vaults.

(a) (b)

Fig. 7: San Julián de los Prados Church. (a) Exterior view, showcasing the three-naved basilica floor plan. (b) Inside, the aisles are separated by semicircular arches supported by square pillars.

The decorative program is exceptional, Fig. 8. The sculptural decoration is concentrated in the holiest space, in the blind arches of the Main Chapel, with numerous reused pieces: capitals, bases, shafts, and pilasters, reflecting both Roman and Visigothic traditions, of exceptional design and quality. The frescoes, with a clear classical influence, display a wonderful repertoire of vegetal, geometric, and architectural motifs, as well as the image of the True Cross, repeatedly depicted along the walls.

Fig. 8: Visuals of the interior decorative program.

THE OLD TOWN OF OVIEDO

The historic center of Oviedo retains a 19th-century charm that is hard to find in other Spanish cities. In addition to its truly significant heritage, renovations and reconstructions over the last decade have been exclusively focused on emphasizing this historical character. Pedestrian streets enhance the sensation of stepping back in time.

We will walk through the intricate network of pedestrian streets, including San Francisco, Cimadevilla -Fig. 9(a)-, Santa Ana -Fig. 9(b)-, Magdalena, Fierro -Fig. 9(c)-, or El Peso Street. In the course of our stroll, we will reach several squares such as Porlier -Fig. 9(d)-, the Cathedral Square, Trascorrales -Fig. 9(e)-, the Town Hall Square -Fig. 9(f)-, Fontán Square -Fig. 9(g)-, Daoiz and Velarde Square, and Riego Square. Here, we can admire the exteriors of magnificent buildings such as the Palace of the Count of Toreno, the Valdecárzana-Heredia Palace, Velarde Palace, the former Monastery of San Vicente, the Church of San Isidoro el Real, the Casa de las Comedias, or the Palace of the Duke of Parque.

Furthermore, the surroundings of the old town will not leave anyone indifferent, and a must-visit is the San Francisco Park, which with its 90000 square meters is one of the focal points of social life in Oviedo. This heart coincides with its main urban lung, consisting of hundreds of centuries-old trees.


(a)


(b)


(c)


(d)


(e)


(f)

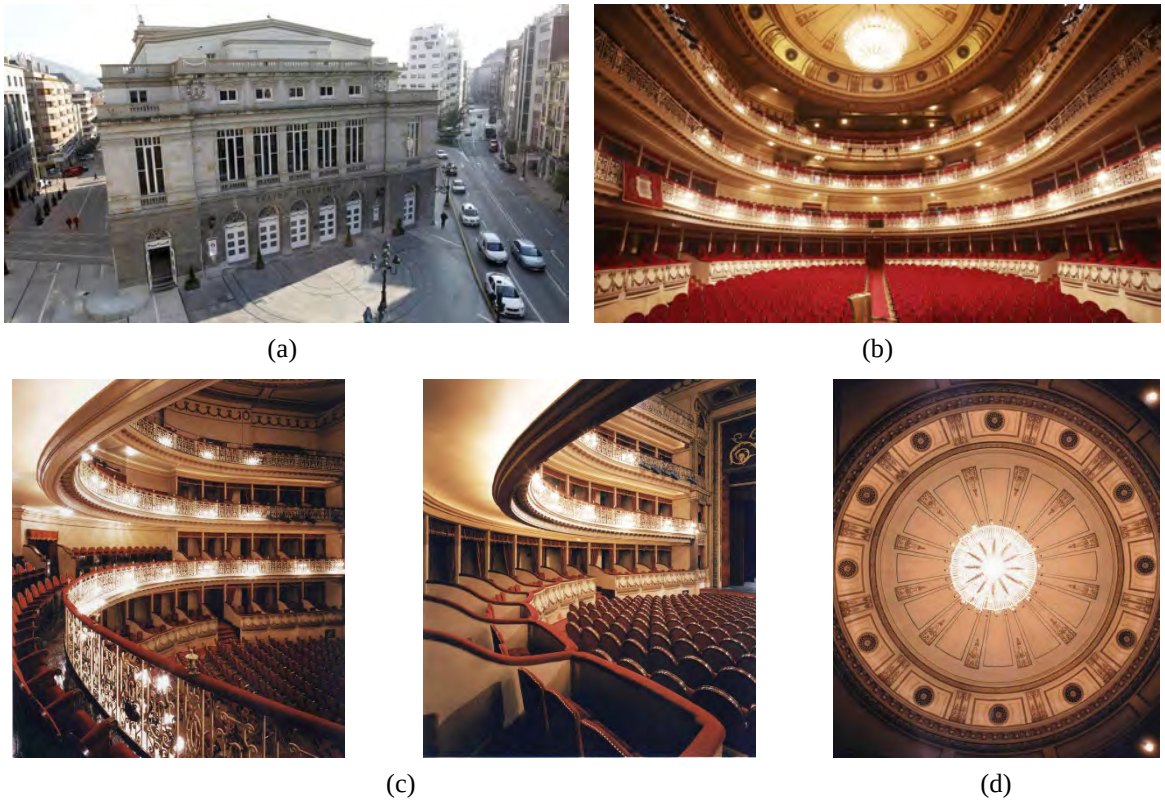

(g)

Fig. 9: Through the old town of Oviedo. (a) Cimadevilla Street. (b) Santa Ana Street. (c) Fierro Street. (d) Porlier Square. (e) Trascorrales Square. (f) Town Hall Square. (g) Fontán Square.

CAMPOAMOR THEATRE: Venue for the Princess of Asturias Awards

The Campoamor Theatre was opened to the public in 1892. It emerged on the grounds of the former Santa Clara convent, serving as a venue for opera performances and theatrical productions in response to the emerging economic bourgeoisie in the capital. The Campoamor Theatre hosts the second oldest opera season in Spain, following Barcelona's Liceo, and is home, along with Madrid, to the only zarzuela season in Spanish territory. Since its inauguration, Campoamor has been a must-visit for renowned musical performers such as Rubinstein, Ravel, Bartok, Rostropovich, among others. Lyrical personalities such as Alfredo Kraus, Montserrat Caballé, José Carreras, Mirella Freni, or Pavarotti have also received applause from the audience. Additionally, every October, it serves as the venue for the Princess of Asturias Awards ceremony, considered by many as the second most important awards in the world after the Nobel Prizes.

The theatre, undergoing several rehabilitations in its history, features a classical exterior with prominent large windows on the first floor, Fig. 10(a). Inside, the Campoamor, with 1491 seats, has a horseshoe-shaped layout with cantilevers for balconies and stalls, featuring bronze applications on the ground floor and wrought iron closures on the upper levels, Fig. 10(b)-(c). In the center of the ceiling, a large dome with a slight curvature hangs a grand chandelier made of bronze and cut glass, Fig. 10(d).



(a) (b)

(c) (d)

Fig. 10: Campoamor Theatre. (a) Exterior. (b) Interior. (c) Balconies and stalls. (d) Detail of the dome with the large hanging lamp.

The first major remodeling took place in 1916, involving an interior restructuring and an increase in seating capacity. During the 1934 Revolution, the theatre suffered extensive damage, reduced to rubble, with only the main facade standing. After the Civil War, the reconstruction and renovation of the theatre began, reopening its doors in September 1948. In 1988, a stage reform was carried out, expanding the orchestra pit and modernizing the stage with the latest technical advancements in mechanized scenic elements and lighting. Additionally, new spaces below ground were created to house modern dressing rooms, rehearsal rooms, a costume workshop, hairdressing, props room, workshops, and stage crew personnel rooms. The old dressing rooms located at the rear facade of the building became the headquarters of the Department of Culture of the Oviedo City Council. Likewise, in 1993, the multipurpose underground hall was transformed into the City of Oviedo Modern Art Center (CAMCO).

The **Princess of Asturias Awards** (formerly known as Prince of Asturias Awards from 1981 to 2014) are honors presented by the heir to the Spanish throne, recognizing outstanding achievements in the fields of science, technology, culture, social issues, and humanity by individuals, institutions, groups, or organizations on an international scale, Fig. 11(a)-(b). Recipients of these awards include Norman Foster, Oscar Niemeyer, Frank Gehry, Rafael Moneo, Ennio Morricone, John Williams, Martin Scorsese, Francis Ford Coppola, Günter Grass, Mario Vargas Llosa, and John H. Elliot, among many others, Fig. 11(c).

The decisions of all the award juries are announced between the months of April and June. Each award includes a diploma, a sculpture by Joan Miró, a badge featuring the coat of arms of the Prince of Asturias Foundation, Fig. 11(d), and a monetary prize.

(a)

(b)

(c)

(d)

Fig. 11: Presentation of the Princess of Asturias Awards. (a) Royal Bagpipe Band "*Ciudad de Oviedo*" during the reception of awardees and attendees. (b) Presidential Table. (c) Perspectives of the Campoamor Theatre during the award ceremony. (d) Emblem of the Princess of Asturias Awards.

Currently, the Princess of Asturias Awards have eight categories:

- Princess of Asturias Award for Communication and Humanities.
- Princess of Asturias Award for Social Sciences.
- Princess of Asturias Award for the Arts.
- Princess of Asturias Award for Literature.
- Princess of Asturias Award for Scientific and Technical Research.
- Princess of Asturias Award for International Cooperation.
- Princess of Asturias Award for Concord.
- Princess of Asturias Award for Sports.

20:15h Return to Gijon.

Thursday, May 9th
Exploring the charms of Aviles
Only Companions

09:00h Departure from the congress venue (*Universidad Laboral* of Gijon).

Aviles is a charming city in Asturias, Spain, that offers a tourist experience filled with history, culture, and contemporary art. During the visit, companions will explore its beautiful historic center, where they will find picturesque streets and squares, Fig. 1, and charming buildings that reflect its rich medieval and maritime past.

(a) (c)

(b) (d)

Fig. 1: Through the old town of Aviles. (a) Spain Square, home to the Town Hall. (b) Álvarez Acebal Square, where the Church of San Nicolás de Bari is located. (c) Bances Candamo Street. (d) Galiana Street.

One of the highlights of the visit will be the Niemeyer Center, an architectural masterpiece designed by the renowned Brazilian architect Oscar Niemeyer, Fig. 2. Here, companions can enjoy its avant-garde architecture and panoramic views of the port and estuary of Avilés from its terraces.

Fig. 2: Niemeyer Centre in Avilés

13:00h Arriving at congress venue.

Thursday, May 9th
Closing Dinner at NH**** hotel of Gijon
For Delegates (full inscriptions, not student inscriptions) and Companions

The closing dinner is going to be developed at **21:00h** in the **NH**** hotel of Gijon**.

Location: Paseo Dr. Fleming, 71, 33203 Gijón, Asturias.

NH**** hotel of Gijon

View from the terrace of the NH hotel

Friday, May 10th: Post-congress trip (OPTIONAL)
Discover the Asturian essence: Covadonga, Lastres, and the Secret of Cider on an unforgettable journey

9:00h Departure from the NH hotel of Gijon.

Visit to the Sanctuary of Our Lady of Covadonga.

Art, heritage, landscape, history, devotion... Covadonga, with its Santina cave, its neo-Romanesque basilica, and its fantastic natural surroundings, is a must-visit destination on a tourist getaway to Asturias.

It is said that in the Middle Ages, Covadonga already had an hermitage, although it was from the victory of King Don Pelayo against the Muslims when the cult of the Virgin of the Battles spread. First, a Benedictine monastery was established here, with the church of Santa María in the cave, and later Felipe IV founded a collegiate church. In October 1777, the church of the Holy Cave was engulfed in flames. When the news reached King Carlos III, he ordered the construction of a new monumental temple, for which he sent his court architect, Ventura Rodríguez, who designed a great sanctuary, but it was not carried out. The current temple, in neo-Romanesque style, was conceived by Roberto Frassinelli and built entirely between 1877 and 1901, Fig. 1. This temple was elevated to the status of basilica by Pope Leo XIII. Inside, two paintings of the Annunciation by Vicente Carducho, and the 'Proclamation of Pelayo' by Luis de Madrazo stand out, as well as a sculpture of the Virgin with the Child by Joan Samsó.

Fig. 1: Basilica of Santa María la Real de Covadonga.

The Holy Cave houses the Virgin of Covadonga, the most revered image in Asturias, Fig. 2. The altar is decorated with images alluding to the Battle of Covadonga, and nearby are the tombs of Don Pelayo and his wife Gauiosa, as well as those of their son-in-law Alfonso I and Hermelinda.

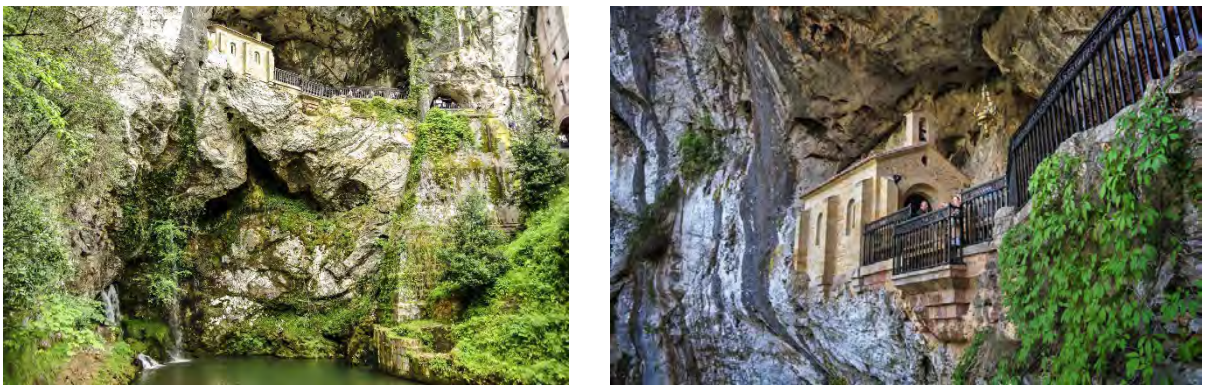


Fig. 2: The Holy Cave of Covadonga.

Next to the Holy Cave is the monastery of San Pedro, inhabited by a community of canons in a building that also houses a spiritual retreat house. After discovering the great monument erected in honor of Don Pelayo, visitors can access the museum of the Basilica, located in the choir building, which contains an interesting exhibition on the history of Covadonga, the famous battle, the construction of the basilica, royal visits, special celebrations, ex-votos, etc. Visitors can also admire the treasure of the Santina, with its trousseau, offerings, etc.

Visit to Cangas de Onís and lunch in the area.

Cangas de Onís was the capital of the Kingdom of Asturias until 774. Here, an epic battle was fought, the Battle of Covadonga (722), which elevated the figure of Don Pelayo and marked the beginning of the Christian reconquest of the Iberian Peninsula. After the epic, oblivion arrived, but even though Cangas de Onís was no longer a city of kings, it remained beautiful and dynamic.

Cangas de Onís, Covadonga, and the Picos de Europa form an essential space for any traveler who enjoys history and nature. Notable landmarks include the «Roman Bridge» of Cangas de Onís, Fig. 3(a), the Church of the Assumption and the statue of Don Pelayo, Fig. 3(b), the Hermitage of the Holy Cross, Fig. 3(c), and an incomparable natural setting, Fig. 3(d).

(a)

(c)

(d)

(b)

Fig. 3: Different attractions in the region of Cangas de Onís.

Guided tour of Lastres, one of the most picturesque villages on the Asturian coast.

Nestled between the sea and the mountains, you will quickly understand why Lastres is considered one of the most beautiful villages in Spain, a distinction it officially holds and truly deserves, Fig. 4. This seaside enclave on the eastern coast of Asturias is famous for its centuries-old fishing activity, its excellent seafood cuisine, and its unique beauty. From the San Roque viewpoint, at the highest point, you will have an unbeatable panoramic view of the village, its beaches, the Sierra del Sueve, and the Picos de Europa.

Fig. 4: Visuals of the location of Lastres.

Lastres boasts a spectacular old town with cobbled streets, palaces, and heraldic houses intermingling with simple fishermen's dwellings, all sharing a common denominator: the sea breeze that constantly caresses them and the splendid views of the Cantabrian Sea and Monte Sueve, Fig. 5. There are many charming spots: the neighborhood of the Whale Hunters, the Chapel of Buen Suceso, the Clock Tower, and the Church of Santa María de Sábada.

Fig. 5: Strolling through the streets of Lastres.

Visit to a family-owned cidery (dedicated exclusively to cider production) **in the Cider Region** where we will learn more about cider culture.

20:00h Arrival at NH hotel of Gijon.