



# FisMat 2015



University of Palermo - September 28 - October 2, 2015 - Conference Chairs: Ezio Puppini (CNISM) - Corrado Spinella (CNR)

## Italian National Conference on Condensed Matter Physics (Including Optics, Photonics, Liquids, Soft Matter)

*Palermo, September 28 - October 2, 2015*

# BOOK OF ABSTRACT

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ISBN 978-88-907460-8-6



UNIVERSITÀ  
DEGLI STUDI  
DI PALERMO

Dipartimento di Fisica e Chimica

Various samples have been analysed through their TL and OSL emissions. Specific TL protocols have been developed to test sensitivity and sensitivity changes, the extent of optical bleaching and the signal regeneration by sunlight.

Despite the encouraging results, the protocols are far from being well defined, due to the difficulty in separating the vitreous component, strongly affected by anomalous fading, from the dosimetric component due to the crystalline micro-inclusions.

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#### #324 - Comparison between NMR and MIP in characterizing porosity of limestone used in Cultural Heritage

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Limestone with different porosity are used extensively as a sculptural and architectural stone in artistic-architectural field. As it is known, this kind of material is subjected to physico-chemical decay that involves the loss of surface and in-depth cohesion [1].

Consolidation interventions are performed in order to preserve building and decorative surfaces of architectural monuments, to reduce their degradation rate and to improve cohesion and adhesion in the stone [2].

Porosity of stone and pore size distribution are important factors to evaluate the effectiveness of a consolidation treatment and they are normally performed using a single technique such as mercury intrusion porosimetry, MIP [3]. Unfortunately, the instrumental limitations of this technique such as the assumptions on pore geometry lead to incomplete, sometimes deceptive results if used alone. Moreover, it leads to the destruction of the analyzed material and to the impossibility to test the same sample after a consolidation treatment.

Nuclear Magnetic Resonance (NMR) relaxometry of water <sup>1</sup>H nuclei can be also exploited to investigate pore space structure in high surface-to-volume ratio (S/V) systems (characterized by small pore size). NMR relaxation times of confined water depend on properties of the porous medium such as S/V and pore size distribution. Furthermore, in the last years portable devices for NMR relaxometry have been developed for *in situ*, non-destructive and non-invasive measurements consequently these instrumentations are able to analyze pore distribution before and after consolidation treatment [4].

In this experimental investigation results from NMR relaxometry and mercury intrusion porosimetry are compared with the aim at studying various type of limestone materials with different porosity. The performances of the two technique are compared and results are discussed. This analysis is preliminary for any investigation of the effectiveness of consolidation treatment.

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