University of Milano-Bicocca
PhD Course in Chemical, Geological and Environmental Sciences
Call for Interest 42nd cycle – session II - Curriculum Geological Sciences

		Supervisor	**Valerio Cerantola**
Title	**Structure and properties of sulphur-bearing magmas at extreme conditions with implications for Earth and Solar System evolution**		
Silicate melts are central to the differentiation and evolution of planetary interiors, yet the role of sulphur in controlling their structure, speciation, and physicochemical properties at high pressure remains poorly constrained. This project aims to investigate how sulphur is incorporated into basaltic and mantle-like silicate glasses and melts under different pressure–temperature and redox conditions, and how these mechanisms affect melt structure and properties in terrestrial and planetary mantle environments. The research will combine synthesis of sulphur-bearing glasses in a gas-mixing furnace, compositional and microstructural characterization by FIB/SEM-EDS, Raman spectroscopy and TEM, diamond anvil cell experiments, and synchrotron techniques such as X-ray diffraction with Pair Distribution Function analysis and X-ray Raman scattering. Interpretation will be supported by DFT/MD simulations. Activities will involve ~50% laboratory/experimental work, ~30% data analysis/modelling and ~20% proposal and manuscript writing. The PhD includes a mandatory 12-month research period abroad at leading international facilities and partner institutions (e.g., ESRF, EuXFEL or institutions linked to the project). The position is project-bound within the ERC Consolidator Grant S-CAPE and is supported by dedicated project funding covering experimental campaigns, travel and analytical costs beyond standard PhD allocations.			
Supervisor webpage: https://www.unimib.it/valerio-cerantola			
Notes: scholarship funded within the framework of the ERC project S-cape			

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		Supervisor	**Nicola Piana Agostinetti** (co-supervisor: Pasquale De Gori)
Title	**Multi-scale Multi-Observable Seismic Model of the Centro-Mediterranean Region**		
Lithospheric structure of the Centro-Mediterranean region (along the lines of the following INGV objectives: OST1.1 Dalla struttura profonda alla modellazione dei processi; OST1.2 Modello strutturale e cinematico litosferico della regione centro mediterranea; OST1.3 Implementazione Rete Sismica Nazionale). Many open questions feed the intense debate on the evolution of continental subduction; particularly, on how deeply the lithosphere penetrates and its impact on surface field deformation. In this context, variations (increase) in the buoyancy of the subducting lithosphere, given by the presence of low-density materials in the subducted crust, and/or age and temperature of the subducting mantle, are thought to control both subduction rate and slab dip. The central Mediterranean area constitutes a key case study for understanding the long-term development of continental subduction, where many different structural elements concur in the subduction process and play an active role in its evolution (e.g. rollback, retreat, along-trench extension and so on). The Apennines and the Dinarides orogenic belts are two distinct examples of how this process evolved differently from the subduction of the same Adria microplate (Doglioni et al., 2007; Royden and Faccenna, 2018). The main goal of the PhD is to try to understand how the structural, rheological and compositional heterogeneities of the lithosphere at different spatial scales affect continental subduction.			
Supervisor webpage: https://www.unimib.it/nicola-piana-agostinetti			
Notes: scholarship funded by INGV - Istituto Nazionale di Geofisica e Vulcanologia			