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Current status and perspectives of CoMET laboratory

The COMET (Coating Materials for Einstein Telescope) laboratory of the University of Padua is growing in Rovigo within the ETIC project. This laboratory will be able to produce samples on demand for the international scientific community, fostering the development of new materials and treatments that can, in the future, be reproduced on a large scale to realize the mirrors of ET and other gravitational interferometers. This facility will be dedicated to the production of GW-quality coating samples and to the study of deposition processes crucial for high-quality mirror fabrication. The laboratory will focus on the R&D of innovative optical films characterized by properties such as extreme transparency and high mechanical quality factor. Among its main objectives is the identification and elimination of the physical causes of the optical absorption of coatings and sources of mechanical dissipation. Both of these parameters are critically influenced by complex factors such as the structural, mechanical, compositional, and surface properties of the materials.
CoMET will be equipped with ad-hoc designed deposition machines: a Dual Ion Beam Sputtering system and an Ion Assisted Magnetron Sputtering system for the deposition under controlled conditions of multi-element coatings. During the design of the deposition machines and the facility in general, we have paid a lot of attention to reaching a high level of control of the deposition processes and to minimizing any impurity sources, which can compromise high-quality optical coatings. The machines will also feature several in-situ characterization tools to study the deposition process and the material characteristics while the process is carried out. The CoMET laboratory is now under construction and will be operational in 2026. In this talk, we will give an update on its status and illustrate the specific details of the possibilities enabled by this new facility to the GW community.

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