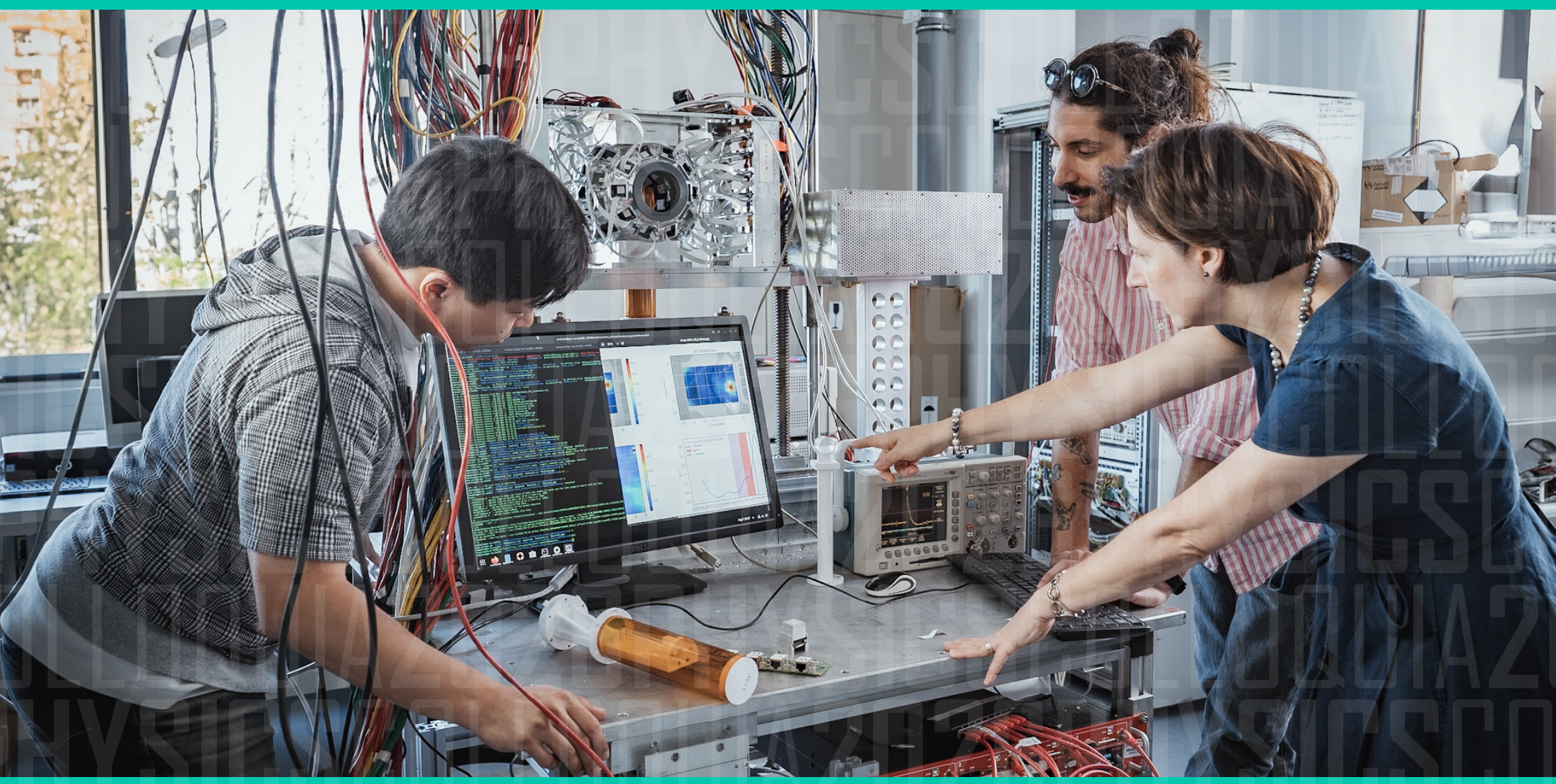
PHYSICSCOLLOQUIA2026



Starting from the first clinical treatments at the Lawrence Berkeley National Laboratory in 1954 (protons) and 1975 (heavier ions), clinical use of ion beams continues to grow almost exponentially worldwide.
The main rationale of ion beam therapy lies in the favorable physical interaction properties of swift ions in matter, which enable concentrating most of the energy deposition in a well-localized maximum, the so-called Bragg peak. By adjusting the placement of the Bragg peak in space through variation of the initial beam energy and magnetic beam steering, it is possible to achieve optimal coverage of the tumour volume along with better sparing of normal tissue and critical organs, compared to the widely established X-ray therapy.
However, despite considerable developments in accelerator technology, beam delivery, treatment planning and in-room volumetric image guidance, full clinical exploitation of these advantageous properties is still hampered by several sources of uncertainties in the delivery of the intended treatment and thorough understanding of the underlying biological mechanisms of radiation interaction in vivo.
This talk will review ongoing experimental medical physics research aiming to promote novel in-room imaging approaches that can help reduce uncertainties in treatment planning and delivery, as well as open new prospects for biological guidance.
Moreover, it will present the development of an advanced preclinical image-guided research platform designed to support the unraveling of the complex in vivo response of tumour and normal tissue to radiation, and will highlight its recent first in vivo deployment.

MAY 26

KATIA PARODI | Ludwig-Maximilians-Universität München

NEW FRONTIERS IN IMAGE-GUIDED PARTICLE THERAPY

3:00 p.m. | **CLASSROOM A** | Via Celoria 16 | Milan

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