Plasma Astro Seminar

Prof. Gianluca Sarri

Queen's University Belfast UK

Title: Current status and next steps in the generation and application of particle and radiation sources at petawatt-scale laser facilities

Time: 10:00-11:30, 26 August (Monday), Shanghai time

Host: Yipeng Wu (吴益鹏)

Location: N601

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Abstract:

The fast-paced development in laser technology is now enabling the production and exploitation of ultra-high power laser pulses (> PW) with focussed intensities approaching 10^23 Wcm^-2. Such extreme laser pulses allow for the plasma-based acceleration of electron beams with unique characteristics, including femtosecond-scale duration, energies above the GeV, and nC-scale charges, in a compact setup. In this seminar, we will present state-of-the-art results on the generation of secondary particle and radiation sources, including positron and muon beams and x-ray and gamma-ray radiation and discuss proof-of-principle demonstration experiments on their suitability to study fundamental science and to enable disruptive applications in areas as diverse as healthcare, material science, and manufacturing. An outlook of the exciting perspectives offered by the next generation of high-power lasers (>10PW) will also be presented.

Biography:

Gianluca Sarri is a professor in applied optics and laser at Queen's University Belfast UK. Prof. Sarri's work is mainly focused on the generation and application of particle and radiation sources driven by high-power laser systems. Main applications of interest span from fundamental studies of strong-field quantum electrodynamics and laboratory astrophysics to novel and disruptive applications in healthcare, material science and manufacturing. Landmark results in this area include the first generation of ultra-bright MeV radiation from non-linear Compton scattering, the first experimental demonstration of quantum effects in radiation reaction, the first generation of a neutral electron-positron plasma in the laboratory, and the first generation of high-quality and ultra-short GeV-scale positron beams.

Prof. Sarri is a routine user of several large-scale laser and accelerator facilities, including the Central Laser Facility (UK), the Stanford Linear Accelerator (USA), Apollon (France), and the Extreme Light Infrastructure (Europe). Prof. Sarri is a founder and member of the steering committee of the EuPRAXIA facility, a member of several national and international strategy groups and committees (including ALEGRO, the Europan particle physics strategy group, LUXE, and PWASC), and an organiser of some of the largest international conferences in the field (including Ex-HILP, EAAC, and LPHYS).

Astronomy and Astrophysics Division
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