Laser-driven positron sources for industrial and fundamental science applications

Academic Supervisor: Prof. Gianluca Sarri (g.sarri@qub.ac.uk)

Eligibility: to be considered eligible you must hold at least a 2.1 BSc (or equivalent) in Physics or a relevant subject.

Funding and timeline: the PhD project will be funded through the EuPRAXIA Prepartory Phase Project for a duration of 3 years, starting on the 1st of October 2022. The overall funding awarded covers Queen's University home tuition fees and a tax-free monthly stipend paid monthly in arrears.

Project background and description: the group of Prof. Gianluca Sarri is one the leading groups in the European project EuPRAXIA (European Plasma Research Accelerator with Excellence in Applications [1]), aimed at the construction of the first plasma-based particle accelerator facility in the world for industrial applications. Recently, the EuPRAXIA project has been included by the European Union in the ESFRI (European Strategy Forum on Research Infrastructure) roadmap [2], which identifies the large-scale research facilities that the EU is intending to build in the near-term. As such, we are currently starting the technical design of the facility, towards its construction.

Two of the main user areas of EuPRAXIA will deliver positron beams of unique characteristics for applications in both fundamental science and industry. Our group at Queen's University Belfast has pioneered plasma-based generation and characterization of positron beams (see, for instance, Refs. [3-8]), using both large-scale national and international laser facilities and the in-house laser system TARANIS, and have thus been selected to coordinate the design, construction, and operations of positron-based user areas at EuPRAXIA.

The successful candidate will thus join an active and large research group here at Queen's University, working towards the design and exploitation of plasma-based positron beamlines for practical applications, a unique and unmatched endeavour world-wide.

If you are interested and would like to know more, please contact me directly at g.sarri@qub.ac.uk.

References:

[1] R. W. Assman et al. Eur. Phys. J. Special Topics 229236 (2020), p. 3675.
[2] https://www.esfri.eu/latest-esfri-news/new-ris-roadmap-2021.
[3] G. Sarri et al. Physical Review Letters 110.25 (2013), pp. 255002.
[4] G. Sarri et al. Nature Communications 6.1 (2015) p. 6747.
[5] J. Wariwck et al., Physical Review Letters 119 (2017) 185002.
[6] A. Alejo et al., Scientific Reports 9 (2019) p. 5279.
[7] A. Alejo et al., Plasma Phys. Contr. F. 62 (2020), p. 055013.
[8] T.L. Audet et al. Phys. Rev. Accel. Beams 24 (2021), p. 073402.