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## **Plasma accelerating modules developments for the EuPRAXIA FEL user facility**

*Wednesday 21 August 2024 14:30 (30 minutes)*

The EuPRAXIA project offers the opportunity to produce free-electron laser radiations from accelerated electron beams using plasma technology in compact structures. Furthermore, the FELs radiations, in turn, represent a formidable tool to investigate matter at the sub-atomic level by generating coherent light pulses with sub-ångström wavelengths and sub-femtosecond durations. Achieving such a result is necessarily linked to the ability to design and construct dedicated devices suitable both for formation and confinement of plasmas in thin structures, which are mounted inside the particle accelerator. In recent years, these motivations have driven an intense technological development of plasma accelerating modules in order to achieve high gradients while retaining the high quality of accelerated beams, based on what is required to produce FEL radiations. Therefore, as will be discussed, discharge capillaries, gas cell or gas jets have been designed for acceleration and focusing experiments to control plasma properties, as stability, density etc., in order to optimize the interaction with electron beams. Prospects for high repetition rate module development will be also discussed.

### **Footnotes**

### **Funding Agency**

**Primary author:** BIAGIONI, Angelo (Istituto Nazionale di Fisica Nucleare)

**Presenter:** BIAGIONI, Angelo (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Novel acceleration and FEL concepts

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