

# Laser driven magnetic filaments in relativistically transparent plasmas as a platform for high-field science

*Thursday 4 November 2021 17:05 (25 minutes)*

High-power high-intensity multi-beam laser systems that are becoming operational around the world can now be used to create a platform for high-field science that is based on relativistically transparent magnetic filaments driven by irradiating lasers within a dense plasma. The strength of the quasistatic field can be comparable to that of the laser, reaching the multi-GG level. This talk will review several phenomena that can be studied with experimentally achievable laser intensities at multi-PW laser facilities. These include emission of dense gamma-ray beams in the quantum regime and electron-positron pair creation from light alone. Astrophysical environments are known for exotic physics regimes that involve generation of extreme magnetic fields and creation of matter and antimatter from light alone. The discussed platform provides a potential path towards recreating relevant regimes in laboratory conditions.

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**Session Classification:** Talks