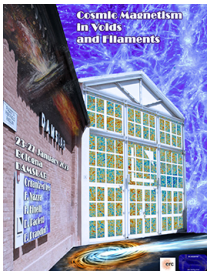


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# Magnetogenesis in the first galaxies: the impact of seeding processes on galaxy formation

*Tuesday, 24 January 2023 14:30 (30 minutes)*

The origin of the ubiquitous cosmic magnetic fields remains one of the big open questions in astrophysics, with many different seeding mechanisms being proposed over the years. Recently, it has been shown that magnetic fields can be created in the ionizing photon shadow behind overdense regions around the first galaxies. I will present the first ever cosmological simulations of such seeding mechanisms, made possible by recent numerical advancements which couple together a radiation transport and a magneto-hydrodynamical solvers. I will display results from two simulation suites, one zooming on a single galaxy (hence reaching high resolution), and one focusing on large-scale properties of the Universe. Each suite also includes runs with more standard seeding mechanism, i.e. the Biermann battery, injection from supernova explosions, and a cosmological seed field. Each simulation include a state-of-the-art galaxy formation model, necessary in order to capture as well as possible the physics responsible for the magnetic field amplification, a necessary step in order to connect the seeding mechanisms to low-redshift observations. After discussing the evolution of magnetic fields under different seeding conditions, and after showing that at z~0 the simulated magnetic field in galaxies is completely agnostic to the injection mechanisms and consistent with available measurements, I will describe how the inter-galactic medium magnetisation is very different in the models investigated, and discuss comparisons with available constraints.

**Presenter:** GARALDI, Enrico (Max-Planck-Institut fuer Astrophysik)

**Session Classification:** Tuesday