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Pulsar magnetospheres and their radiation: a multi-scale challenge ALEXANDER PHILIPPOV, Flatiron Institute, Center for Computational Astrophysics — In this talk I will review recent advances in modeling pulsar magnetospheres using a combination of global and local first-principles kinetic plasma simulations. This numerical approach allowed to shed light on several long-standing questions in pulsar astrophysics, including the behavior of pair discharges, the nature of magnetic dissipation and production of high-energy emission. Unexpectedly, simulations showed that effects of general relativity play a crucial role in pulsar activity. Finally, I will discuss strategies that would allow to answer the most fundamental question about pulsars, e.g. how do they produce their remarkable coherent radio emission.

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