数学与系统科学研究院

计算数学所定期网络学术报告

报告人： Pdoc. Yingzhe Li

（ *Max Planck Institute for Plasma Physics* ）

报告题目：

Geometric Particle-in-Cell methods for the Vlasov-Maxwell equations with spin effects

邀请人：孙雅娟 研究员

报告时间：2021 年 12 月 9 日（周四）

下午 16:00-17:00

报告工具：腾讯会议（ID: 605 4978 9293）

会议链接：

https://meeting.tencent.com/dm/qw8QMyFVg88p

Abstract：

We propose a numerical scheme to solve the semiclassical Vlasov-Maxwell equations for electrons with spin. The electron gas is described by a distribution function that evolves in an extended 9-dimensional phase space. Using suitable approximations and symmetries, the extended phase space can be reduced to 5D. It can be shown that the spin Vlasov-Maxwell equations enjoy a Hamiltonian structure that motivates the use of the recently developed geometric particle-in-cell (PIC) methods. Here, the geometric PIC approach is generalized to the case of electrons with spin. Total energy conservation is very well satisfied, with a relative error below 0.05%.

As a relevant example, we study the stimulated Raman scattering of an electromagnetic wave interacting with an underdense plasma, where the electrons are partially or fully spin polarized. It is shown that the Raman instability is very effective in destroying the electron polarization.

欢迎大家参加！