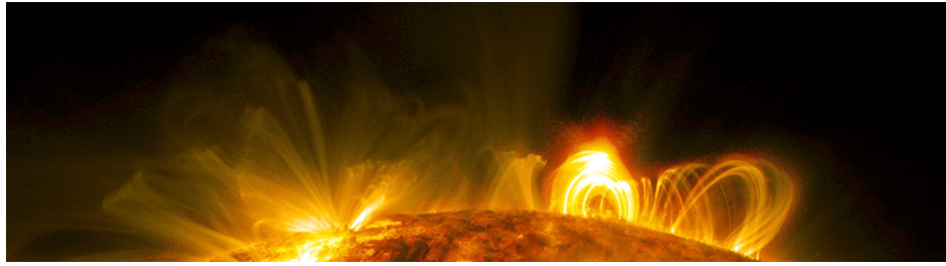


## Particle Acceleration in Solar Flares and the Plasma Universe – Deciphering its features under magnetic reconnection



Contribution ID: 67

Type: **Poster**

### Multiple Boris integrators for particle-in-cell (PIC) simulation

*Wednesday, 17 November 2021 09:45 (1 hour)*

Particle-in-cell (PIC) simulation has long been used in theoretical plasma physics. In PIC simulation, the Boris solver is the de-facto standard for solving particle motion, and it has been used over a half century. Meanwhile, there is a continuous demand for better particle solvers. In this contribution, we introduce a family of Boris-type schemes for integrating the motion of charged particles. We call the new solvers the multiple Boris solvers. The new solvers essentially repeat the standard two-step procedure multiple times in the Lorentz-force part, and we derive a single-step form for arbitrary subcycle number  $n$ . The new solvers give  $n^2$  times smaller errors, allow larger timesteps, but they are computationally affordable for moderate  $n$ . The multiple Boris solvers also reduce a numerical error in long-term plasma motion in a relativistic magnetized flow.

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