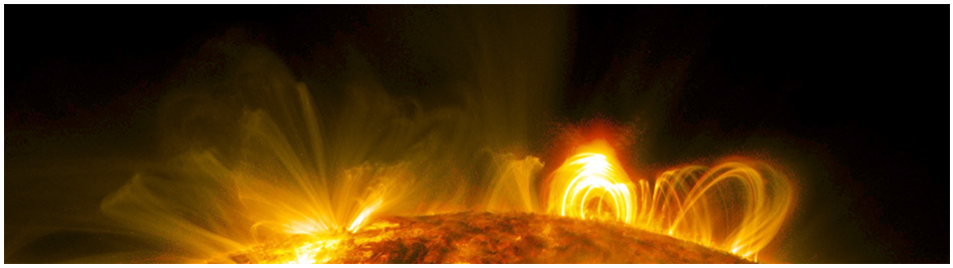

Contribution ID: **22** Type: **Poster**

Cold-chain Comptonization in black hole coronae

Thursday, 18 November 2021 09:45 (1 hour)

What powers the hard, non-thermal X-rays from the coronae of accreting black holes—against the strong inverse Compton cooling losses due to the scattering by soft accretion disk photons—is an unsolved mystery in astrophysics. We perform 2D particle-in cell simulations of reconnection in magnetically dominated (σ»1) electron-positron and electron-ion plasmas subject to strong Compton cooling. We find that the particle energy spectrum is dominated by a peak at trans-relativistic energies, which results primarily from the bulk motions of 'plasmoids' laden with cooled-down particles. Its peak has a quasi-Maxwellian shape with an effective temperature of ~100 keV, which depends only weakly on the flow magnetization and the strength of radiative cooling. We complement our particle-in-cell studies with Monte-Carlo calculations of the transfer of seed soft photons through the reconnection layer of our simulations, and we produce synthetic X-ray spectra. We demonstrate that Comptonization by the bulk motions of a chain of Compton cooled plasmoids can naturally explain the hard-state spectra of accreting black holes.

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