



Contribution ID: 66

Type: **not specified**

Model for nuclear radio emission in super-Eddington AGNs

Friday 28 October 2022 15:00 (5 minutes)

“Romero, G.E. The radio emission mechanism in active galactic nuclei (AGN) with high accretion rates is unclear. We propose that clouds from the broad-line region (BLR) propagating with supersonic velocities in the wind of the accretion disk may lead to the production of non-thermal radiation. We determine the conditions under which the BLR clouds are not destroyed by shocks or hydrodynamic instabilities. Such clouds produce bowshocks in the wind that are suitable sites for particle acceleration. We develop a semi-analytical model to calculate the distribution of relativistic particles in these bowshocks and the associated spectral energy distribution (SED) of the emitted radiation. For typical parameters of super-accreting AGNs, we find that they can produce non-thermal radiation from radio up to a few tens of TeV, with very slight absorption effects, if the interaction occurs outside the wind photosphere.

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Session Classification: High energy astronomy and astronomical physics