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Relativistic flows in active galaxies

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Summary

I will consider some implications of the rapid X-ray and TeV variability observed in M87 and TeV blazars for the dynamics and collimation of the associated jets. A particular attention will be given to the apparent conflict between the high Lorentz factors implied by opacity constraints and the small Lorentz factors inferred from radio observations, and the violent activity observed in the HST-1 knot in M87 that seems to indicate a very small emission zone at a large distance from the BH. A model for jet focusing motivated by the above considerations will be described and employed to demonstrate that modest radiative cooling can lead to recollimation of a relativistic jet in a nozzle having a very small cross-sectional radius. Such a configuration can produce rapid variability at large distances from the central engine in a low speed pattern. I will also discuss other scenarios for the very rapid TeV flares observed with HESS and MAGIC in some blazars, that accommodate the relatively small Doppler factors inferred from radio observations.

Orateur: Prof. LEVINSON, Amir