Probing Dark Matter with AGN Jets

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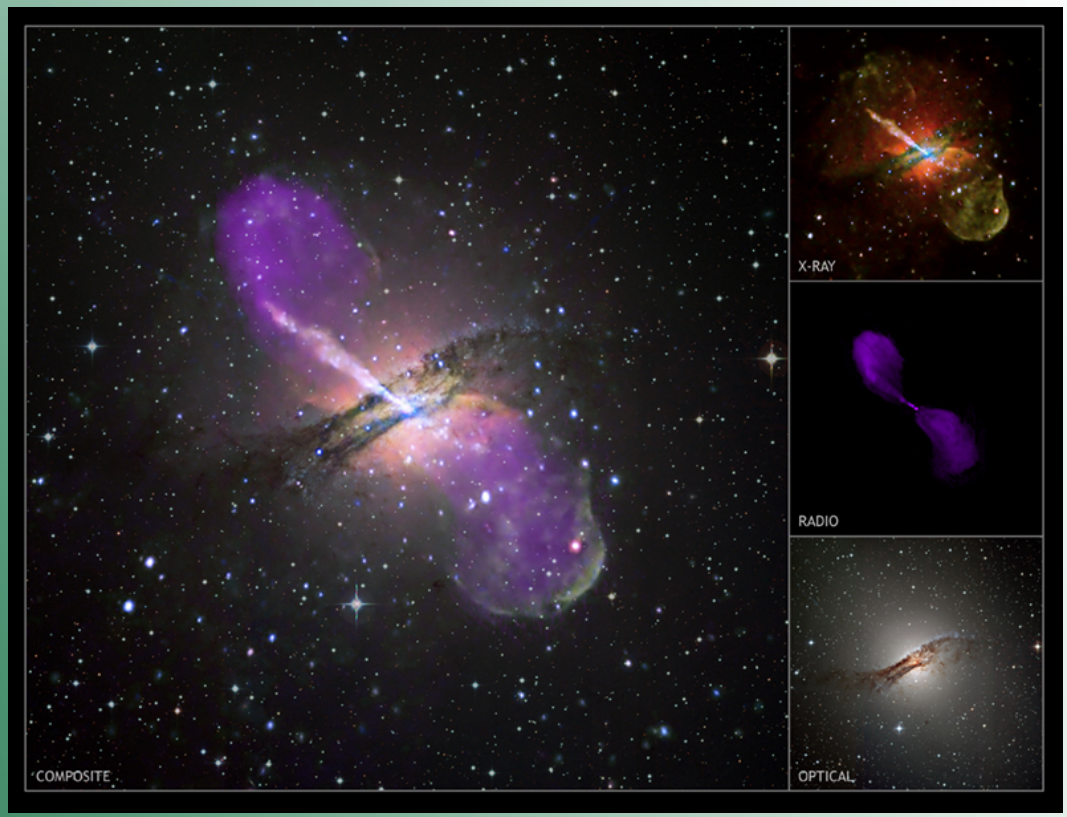
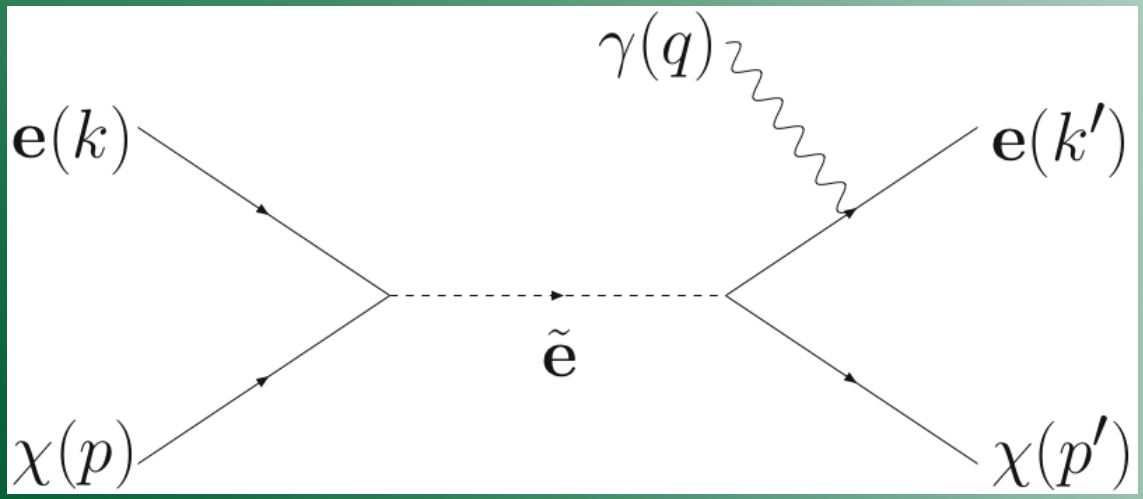
The idea

- Active Galactic Nuclei are sources of powerful and collimated jets containing ultra relativistic electrons and protons.
- Study the scattering of those high energy particles off the dark matter present in the AGN halo with the emission of photons.
- If dark matter is heavy, the photons will be isotropically distributed, and if they have a distinct spectral feature we can hope to detect a signal.
- Identify best AGN candidates (jet at an angle with the line of sight): Centaurus A and M87.
- Original idea by Bloom & Wells (98).

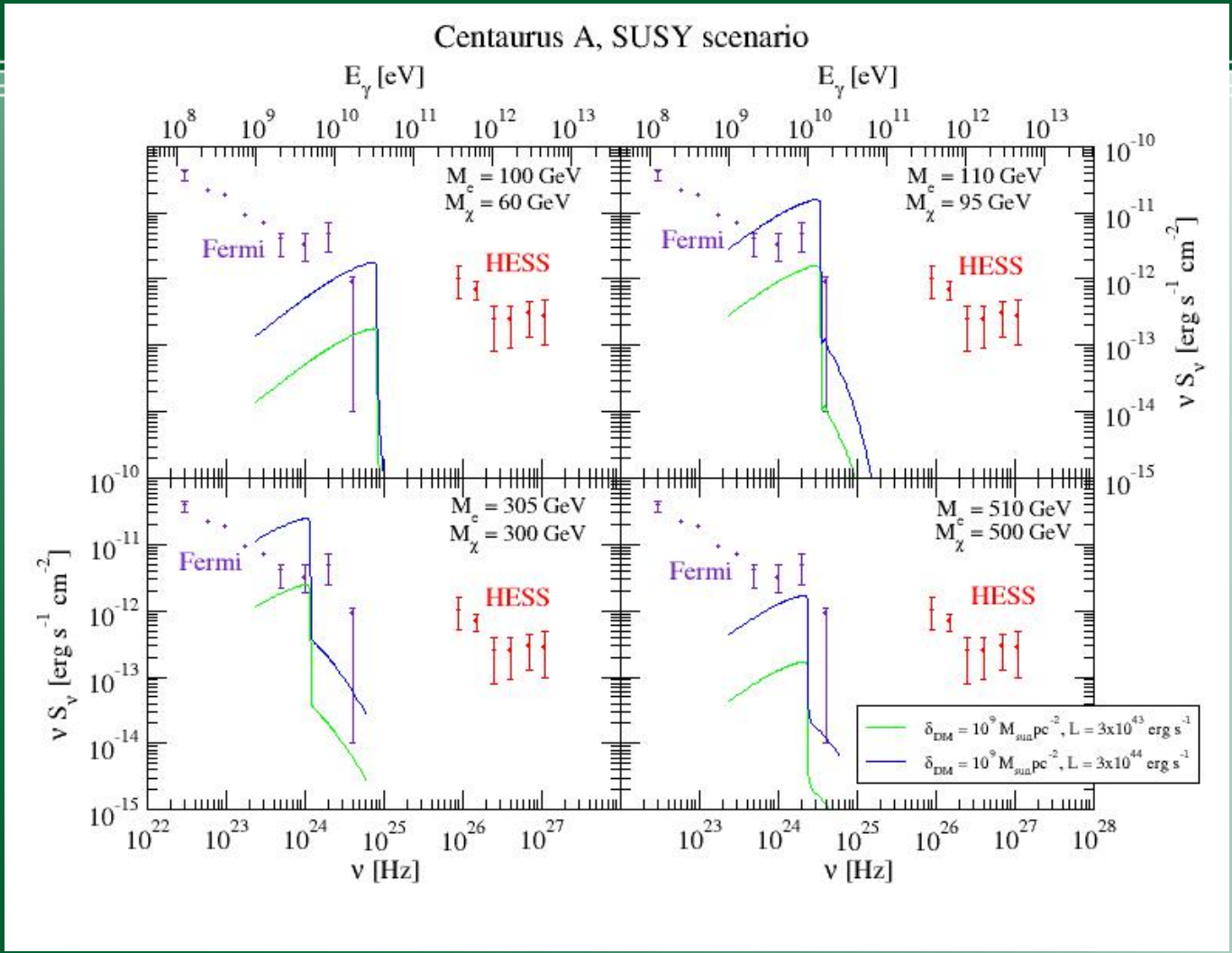


The calculation

- Model the dark matter density distribution (Gondolo & Silk, 99). The profile has a spike in regions close to the core.
- Use broken power law for the electron (proton) energy distribution.
- If dark matter is the lightest neutralino (MSSM), compute the differential cross section for the following process



Results



[Fermi-LAT Observations of the Core of Centaurus A, APS meeting (February 2010)]
[HESS - arXiv:0903.1582]

Comments and outlook

- This is still work in progress.
- Deeper understanding of the astrophysics of AGN is needed to have the final word.
- These predictions could be tested in the near future.