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James Buckley (Washington U in St Louis): Search for dark matter with ACT's

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Annihilation of WIMPs into gamma-rays could provide an observable signal in future ground-based gamma-ray experiments like CTA over most of the natural parameter space for a thermal relic. High energy gamma-ray observations provide key constraints on WIMP DM, and together with complimentary direct detection and collider-based searches comprise a comprehensive program for
either confirming or ruling out the thermal WIMP hypothesis. In the event of a detection of WIMPs, the universal gamma-ray spectrum could determine the mass of the DM particle and provide particle identification through the imprint of
various annihilation channels on the detailed spectrum. Together with astrophysical measurements of galactic dynamics, gamma-ray measurements could go beyond detecting dark matter in the laboratory to determining the detailed distribution of dark matter in galactic halos and the role of DM in structure formation. Current searches with imaging atmospheric Cherenkov telescopes like
VERITAS, MAGIC and HESS already provide important constraints on high mass WIMPs, complementing Fermi constraints on lower mass models. CTA observations of the Galactic Center could constrain most of the remaining
natural parameter space for WIMP DM. Ground-based gamma-ray measurements can also provide constraints on non-WIMP dark matter including Axion-Like-Particles
(ALPs), where the oscillations between photons (in an astrophysical plasma) and Axions can result in a lower apparent attenuation of gamma-rays, evading pair
creation off of the extragalactic background light or high magnetic fields. Effectively, TeV gamma-ray measurements of AGNs, GRBs, or Pulsars can provide
the astrophysical equivalent of light-through-wall experiments. I will summarize results on DM searches from the current generation of IACTs, expected results for CTA or a larger ground-based instrument and the prospects for future space-based experiments.

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