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Indirect detection as a probe of the spectrum of primordial perturbations on small scales

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Events like inflation and phase transitions in the Early Universe could have introduced large density perturbations on very small scales. Such power at large wave-numbers is not constrained by standard probes of the primordial power spectrum like the CMB; existing limits come only from primordial black holes (PBHs). Any additional probe of such small scales would be exceptionally useful in discriminating between e.g. different inflationary models. Moderate-amplitude perturbations can collapse shortly after equality to form ultracompact minihalos (UCMHs) of dark matter, in far greater abundances than PBHs. If dark matter self-annihilates, UCMHs become very promising targets for indirect detection. I will describe the fluxes one might expect from such objects, prospects for observing them with Fermi and Cherenkov telescopes, and demonstrate what limits their non-observation by Fermi places upon the primordial power spectrum.

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