Abstract Submitted
for the DNP13 Meeting of
The American Physical Society

Propagation of Light through Composite Dark Matter AUDREY KVAM, DAVID LATIMER, University of Puget Sound — A concordance of observations indicates that around 80% of the matter in the universe is some unknown dark matter. This dark matter could be comprised of a single structureless particle, but much richer theories exist. Signals from the DAMA, CoGeNT, and CDMS-II dark matter detectors along with the non-observation of dark matter by other detectors motivate theories of composite dark matter along with a "dark" electromagnetic sector. The composite models propose baryon-like or atom-like dark matter. If photons kinetically mix with the "dark" photons, then light traveling through dark matter will experience dispersion. We expect the dispersion to be approximated by the Drude-Lorentz model where the model parameters are particular to a given dark matter candidate. As light travels through the dispersive medium, it can accrue to a frequency-dependent time lag. Measurement of such a time lag can yield clues as to the nature of the dark matter. As a first application, we model hydrogenic dark atoms and use astrophysical data to constrain the mass, binding energy, and the fractional electric charge of the dark atoms.

Audrey Kvam
University of Puget Sound

Date submitted: 31 Jul 2013 Electronic form version 1.4