Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Hunting for topological dark matter with atomic clocks[1] ANDREI DEREVIANKO, University of Nevada, Reno, MAXIM POSPELOV, Perimeter Institute and University of Victoria — The cosmological applications of atomic clocks so far have been limited to searches of the uniform-in-time drift of fundamental constants. In this paper, we point out that a transient in time change of fundamental constants can be induced by dark matter objects that have large spatial extent, and are built from light non-Standard Model fields. The stability of this type of dark matter can be dictated by the topological reasons. We point out that correlated networks of atomic clocks, some of them already in existence, can be used as a powerful tool to search for the topological defect dark matter, thus providing another important fundamental physics application to the ever-improving accuracy of atomic clocks. During the encounter with a topological defect, as it sweeps through the network, initially synchronized clocks will become desynchronized. Time discrepancies between spatially-separated clocks are expected to exhibit a distinct signature, encoding defect's space structure and its interaction strength with the Standard Model fields. Details can be found in arXiv:1311.1244

[1]supported by the NSF

Andrei Derevianko
University of Nevada, Reno

Date submitted: 20 Dec 2013 Electronic form version 1.4