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Using Global Network Precision Measurements to Search for Exotic Physics[1] ALEX ROLLINGS, BENJAMIN ROBERTS, GEOFFREY BLEWITT, CONNER DAILEY, University of Nevada, Reno, MAXIM POSPELOV, University of Victoria, BC, JEFF SHERMAN, NIST, Boulder, WYATT WILLIAMS, ANDREI DEREVIANKO, University of Nevada, Reno, GPS.DM COLLABORATION — The Global Positioning System (GPS) comprises of a constellation of approximately 30 Medium-Earth Orbit satellites equipped with either Cs or Rb atomic clocks, as well as a number of Earth-based receiver stations, many of which employ highly-stable H-maser clocks. More than a decade's worth of high accuracy GPS timing data is currently available. Such a constellation provides a unique opportunity; by analyzing the satellite and terrestrial atomic clock data, it is possible to search for transient signatures of exotic physics, such as dark matter and dark energy. In effect, we utilize the GPS constellation as a 50,000 km aperture dark matter detector. In this poster, we outline some of the details and challenges involved in employing such a network for fundamental physics research, in particular the Bayesian analysis methods that we use for the search. These methods do not only apply to the GPS atomic clocks. Similar approaches can be used for networks of ground-based atomic clocks, magnetometers, gravimeters, and any other precision measurement tools. A. Derevianko and M. Pospelov, Nat. Phys. 10, 933 (2014)

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