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**Difficult Requirements for a Gravitational Wave Mission using Atom Interferometry** PETER L. BENDER, JILA/University of Colorado — A PRL paper by Graham, Hogan, Kasevich, and Rajendran in April, 2013 suggested gravitational wave observations in space using single photon transitions on highly forbidden optical lines for atom interferometry measurements. The main example given was based on use of the 698 nm optical clock transition in Sr-87, a 1000 km baseline, and large momentum transfer laser pulse sequences producing 2400 state transitions for a given atom over a 100 s observation period. A specific scenario for such a mission is needed in order to permit evaluation of the requirements. As a stop-gap, a laser power of 30 W, square laser pulses, 1 m diam. transmitting telescopes, and operation of 4 concurrent pairs of atom interferometers are being assumed. Based on these assumptions, the atom cloud temperature requirement would be below 0.1 pK, and the number of atoms required per cloud would be extremely high. Such a mission would be much more complex than a laser interferometry mission with better overall sensitivity, such as the extensively studied LISA mission or the recently proposed evolved-LISA (eLISA) mission. A LISA Pathfinder mission is scheduled for launch in 2015, funded mainly by ESA . A gravitational wave observation theme is being considered by ESA as part of their Cosmic Vision Programme.

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