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Spin-Exchange Relaxation Free Magnetometer using Hybrid Pumping for the Global Network of Optical Magnetometers for Exotic Physics (GNOME)[1] PERRIN SEGURA, SUNYOOL PARK, ELEDA FERNALD, DHRUV TANDON, JASON STALNAKER, Oberlin College, GNOME COLLABORATION — A network of optical magnetometers has the potential to detect proposed pseudo magnetic effects from exotic-spin couplings as the Earth passes through a topological defect in a coherent field of ultra-light axion-like particles (a proposed candidate for dark matter). The Global Network of Optical Magnetometers to search for Exotic Physics (GNOME) is searching for such a transient signal, using contributions from multiple magnetometer stations to eliminate false positives. We provide an update on the construction of the Oberlin magnetometer: a Rb-K-^{3}He spin-exchange relaxation free (SERF) magnetometer, which has recently been upgraded to include hybrid pumping, where a pump laser polarizes Rb atoms in a vapor cell, which in turn polarizes K atoms through spin exchange collisions. The transmission of a probe laser resonant with the K D_1 transition through the cell is then monitored as an indicator of magnetic field strength. This process decreases the amount of scattered light from the K atoms, which can be reabsorbed by the surrounding K atoms and cause loss of polarization, and is thus expected to improve the sensitivity of the magnetometer.

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