

Abstract Submitted  
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**Development of Gallium-Indium Alloys, Nonmagnetic Test Masses for Exotic Spin-Dependent Force Searches<sup>1</sup>** MARJAN KHOSRAVI, RAKSHYA KHATIWADA, WILLIAM M. SNOW, Indiana Univ - Bloomington, Center for the Exploration of Energy and Matter — Possible new spin-dependent short-range forces of nature in the mm to  $\mu\text{m}$  range which couple to nucleons are now sought in many experiments. Most experiments search for this possible interaction through NMR frequency shifts of polarized nuclei with the introduction of an unpolarized test mass nearby [1]. However, any nonzero magnetic susceptibility of this test mass can produce a systematic error in the measurement. We therefore seek materials with magnetic susceptibilities as close as possible to zero. We synthesized Gallium-Indium (Ga-In) alloys with various Indium percentages which are liquid at room temperature and measured their magnetic susceptibilities using a torsion balance-based commercial device. The measured magnetic susceptibilities range from  $-0.06\text{E-}06$  to  $-0.12\text{E-}06$  cgs volume susceptibility and are consistent with the weighted average of the component susceptibilities. The values are about an order of magnitude lower than water for a substance possessing 4.7 times larger nucleon density. [1] P. H. Chu, A. Dennis, C. B. Fu, H. Gao, R. Khatiwada, G. Laskaris, K. Li, E. Smith, W. M. Snow, H. Yan, and W. Zheng, Phys. Rev. D 87, 011105(R) (2013)

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