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Permanent Magnet with Very Low Field Gradient (0.1G/mm) for NMR Spectroscopy OGNJEN ILIC, Harvard College Student, DAVID ISSADORE, Research Assistant in the Division of Engineering and Applied Sciences, TOM HUNT, Research Assistant in Physics, ROBERT WESTERVELT, Mallinckrodt Professor of Applied Physics and of Physics — Nuclear Magnetic Resonance (NMR) is a powerful analytical tool for obtaining chemical, physical and structural information. To produce the uniform fields required, NMR experiments typically employ large, expensive electromagnets and shimming coils. We have developed a small permanent magnet with an iron yoke that produces a field of $\sim$10 kG with gradient $<$ 0.1G/mm across a 6 mm region for a total field homogeneity of 10 ppm. The system consists of two parallel cylindrical NdFe permanent magnets, 50mm in diameter and 25mm thick, separated by 4mm. The magnets are surrounded by hollow low-carbon steel cylinders with steel caps on each end of the yoke. By adjusting the distance between the yoke caps and the magnet we cancel first-order field strength variations, as shown in simulations. This design is an important innovation for low cost, benchtop NMR systems. *Supported by the NCI MIT-Harvard CCNE.

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