Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Higher Resolution and Faster MRI of ^{31}Phosphorus in Bone MERIDETH FREY, SEAN BARRETT, Yale University, Physics Dept., ZACHARY SETHNA, Princeton University, Physics Dept., KARL INSOGNA, JOSHUA VANHOUTEN, Yale University, School of Medicine, Dept. of Internal Medicine — Probing the internal composition of bone on the sub-100 μm length scale is important to study normal features and to look for signs of disease. However, few useful non-destructive techniques are available to evaluate changes in the bone mineral chemical structure and functional micro-architecture on the interior of bones. MRI would be an excellent candidate, but bone is a particularly challenging tissue to study given the relatively low water density, wider linewidths of its solid components leading to low spatial resolution, and the long imaging time compared to conventional ^{1}H MRI. Our lab has recently made advances in obtaining high spatial resolution (sub-400 μm)^3 three-dimensional ^{31}Phosphorus MRI of bone through use of the quadratic echo line-narrowing sequence (1). In this talk, we describe our current results using proton decoupling to push this technique even further towards the factor of 1000 increase in spatial resolution imposed by fundamental limits. We also discuss our work to speed up imaging through novel, faster reconstruction algorithms that can reconstruct the desired image from very sparse data sets. (1) M. Frey, et al. *PNAS* **109**: 5190 (2012).

Merideth Frey
Yale University, Physics Dept.

Date submitted: 09 Nov 2012 Electronic form version 1.4