

Abstract Submitted  
for the TSF14 Meeting of  
The American Physical Society

**MR Imaging to Screen for Breast Cancer: Transformational magnetism makes it affordable** AKHDIYOR SATTAROV SATTAROV, PETER MCINTYRE, LESZEK MOTOWIDLO, Texas A&M University — Contrast-enhanced magnetic resonance imaging (CE-MRI) is a highly sensitive screening procedure for early detection of breast cancer. We have developed a magnetic design for a 1.5T open-MRI magnet based on Nb<sub>3</sub>Sn superconductor, suitable for use in breast cancer screening. The magnet produces the required homogeneous field only in two spherical regions required for breast imaging. The magnetic design required optimization of the placement of multiple windings that could produce that field distribution with minimum requirement of superconductor. For that purpose we developed a new design methodology in which a domain where windings are permitted is divided into a mesh of independent current elements, the multipole content in the target region is calculated for currents in from each element, and the pattern of optimized currents is calculated through successive orthogonalizations. The optimized windings can be fabricated within a support structure that supports Lorenz forces exerted on individual windings. The approach also accommodates the use of ferromagnetic steel to shield fringe fields. A first design of the a 1.5T open-MRI magnet for double breast screening will be presented.

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Date submitted: 10 Oct 2014

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