

Thesis Portfolio

**Making SABRE Enhanced Low-Field NMR Experiments Accessible to Modern Research
Labs**
(Technical Report)

**The Academic and Social Consequences of Multidisciplinary Laboratory Structure in the
Context of Dr. Warren Warren's Laboratory at Duke University**
(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science
University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree
Bachelor of Science, School of Engineering

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Thesis Prospect

Sociotechnical Synthesis

Most labs are structured in a way that encourages a variety of research that can be categorized under the same field of science. However, Dr. Warren Warren's lab at Duke University somewhat breaks this typical structure by consisting of two groups performing research into different phenomena. One subgroup of the lab does research into laser spectroscopy, and the other subgroup does research into NMR spectroscopy. In this investigation, the dynamics between the mostly autonomous groups and the motivation of their formation will be explored.

Research into the origin and development of the structure may yield insight into the merits it provides, and investigation into the intended effects will be performed to explore the motivations behind it. The general structure may not be rare on its own, but the official and unofficial activities associated with it reveal a philosophy of interdisciplinary collaboration and development of scientific communication skills. This investigation will also focus on uncovering the routines and social consequences that these practices have on the lab members and their communications with the outside world.

The subject of the prospectus and the technical topic for the Dept. of Biomedical Engineering are not related. The technical topic that will be covered is a project to create an easily accessible low-field hyperpolarization device for the purposes of NMR related experimentation. This project is designed to expedite the research into producing viable low-field MRI devices that may be vastly more affordable than current MRIs. In the technical portion of this prospectus, the technical details, social implications, philosophy, and potential ethical effects of the project will be explored in full. The philosophy associated with the project is one of accessibility in an academic and economic sense, which has the potential to cause interesting sociotechnical consequences.