crystal ferromagnetic material will be considered by a consistent application of the established tools of domain theory. In particular, the contributions of the exchange energy and demagnetizing energy will be determined. The domain structure behind the shock wave will be deduced from this domain theoretical analysis. Following this, the shock induced anisotropy effect in polycrystalline ferromagnetic material will be considered. Integral in this consideration is a critical analysis of the averaging process required to predict the random behavior of the polycrystalline structure. The contribution due to finite strain, a serious question in the region of large elastic strain, will be determined. Finally, the effect of porosity on the macroscopic magnetic response of material subject to this effect will be addressed.

Further objectives of this work are the design and implementation of an experimental technique capable of measuring the magnetic state of the shocked ferromagnetic material during the few tenths of a microsecond within which this state exists. With this method data is accumulated in the region of large elastic strain in yttrium iron garnet. Favorable magnetic properties of yttrium iron garnet provide a critical comparison of experiment with theory.