# Vortex phase diagrams of High $T_C$ Superconductors from magnetotransport data

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In recent years, the recognition that a magnetic field induces micro–structural conditions for the behavior of High Tc Superconducting (HTcS) ceramics has given rise to many considerations, both theoretical and experimental ones. On the basis of some advancement in our quantitative understanding of this phenomenon, it seemed appropriate to review our SUPRAS data in a manner that would be useful for many areas of HTcS science. One goal of this talk is to implement a discussion on the result of processing and properties of perovskite materials with respect to vortex phase behavior, including crystallographic texture, boundary motion, diffusion, crystal defects, recrystallisation and secondary phase or particle alignment. In our on–going investigations about the mixed state properties of HTcS we have been indeed intrigued by how to obtain and explain the various lines that dissect the (B,T) plane. In the SUPRAS endeavor we have much used magneto–transport experiments and found the Nernst voltage to be an interesting property. It adequately probes the temperature dependence of phase transition field lines (PTFL), like the upper critical field Bc2 line, the melting (Tm) line, the irreversibility (Ti) line, the glass (Tg) transition line, the electrical resistivity percolation (Tp) line and several structural PTFL separating regions in which the vortices form a triangular (Tt) or square (Ts) lattice or are in a fluid state. This is done by looking at the singularities, i.e. break in slopes, in quantities like the electrical resistivity, the thermoelectric power and the Nernst effect at fixed B values as a function of temperature. The number of observed PTFL is exactly that theoretically predicted.