1071-65-85 **Fengyan Li** and **Liwei Xu*** (xul3@rpi.edu), 301 Amos Eaton Hall, Rensselaer Polytechnic Institute, Troy, NY 12180. *Central Discontinuous Galerkin Methods for ideal MHD Equations with the Exactly Divergence-Free Magnetic Field.*

In this talk, we discuss central discontinuous Galerkin methods for the solution of ideal magnetohydrodynamic (MHD) equations. The methods are based on the original central discontinuous Galerkin methods designed for hyperbolic conservation laws on overlapping meshes, and use different discretization for magnetic induction equations. The resulting schemes carry many features of standard central discontinuous Galerkin methods such as high order accuracy and being free of exact or approximate Riemann solvers. And more importantly, the numerical magnetic field is exactly divergence-free. Such property, desired in reliable simulations of MHD equations, is achieved by first approximating the normal component of the magnetic field through discretizing induction equations on the mesh skeleton, namely, the element interfaces. And then it is followed by an element-by-element divergence-free reconstruction with the matching accuracy. Numerical examples are presented to demonstrate the high order accuracy and the robustness of the schemes. (Received February 21, 2011)