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Computational Mathematics Seminar Series

**Singular Solutions and Large Solutions to Nonlinear Elliptic Equations in Polygonal Domains: Application to Plasma Equilibria****Simon LaBrunie, Texas A&M**Johnston Hall 338  
May 07, 2013 - 03:30 pm**Abstract:**

We present an existence result for the stationary Vlasov--Poisson system in a bounded Lipschitz domain. The system describes the equilibrium of a population of charged particles in their self-consistent electric potential and an external potential.

We study the dependence of the solution on parameters such as the total mass of the distribution, or those entering in the boundary conditions of the potential. Focusing on the case of a plane polygon, we study the singular behavior of the solution near the reentrant corners, and examine the dependence of the singularity coefficients on the parameters of the problem. The analysis makes use of the theory of large solutions to nonlinear elliptic problems. Numerical experiments illustrate and confirm the analysis.

**Speaker's Bio:**

Simon Labrunie received his Ph.D. degree in 1996 from University Paris VII. Since 1999, he has been an associate professor at the University of Lorraine, where he obtained his habilitation in 2005. He has held various positions in several research projects of the French agencies INRIA (National Institute for Computer Science) and ANR (National Research Agency). His research interests include numerical solution of Maxwell's equations, transport equations, and modelling of plasmas.

