

**COLLOQUIUM**  
**UNIVERSITY OF PITTSBURGH**  
**FRIDAY, DECEMBER 1, 2017**

704 THACKERAY HALL

3:30 P.M.

**RUSSELL SCHWAB**

**DEPARTMENT OF MATHEMATICS**  
**MICHIGAN STATE UNIVERSITY**

**A MIN-MAX REPRESENTATION OF  
ELLIPTIC OPERATORS, AND APPLICATIONS**

**ABSTRACT:** We call operators that enjoy the global comparison property “elliptic” operators. This means that the operator preserves ordering between any two functions in its domain, whose graphs are ordered and that agree at a point— i.e. the operator evaluated at this location will have the same ordering. This is a generalization of the fact that we teach to calculus students that at the point of a local maximum, any  $C^2$  function must satisfy  $f''(x_0) \leq 0$ . It turns out that not only does this property serve as a defining feature for many nonlinear partial differential and integro-differential equations, but furthermore, we will present a recent result that shows the global comparison property implies such an operator must have a familiar form that is common to nonlinear elliptic equations. Time permitting, we will elaborate on what this characterization may mean for the interplay between integro-differential equations and (nonlinear) Dirichlet-to-Neumann mappings and free boundary problems like the Hele-Shaw flow.

**Refreshments served at 3:00 p.m.**  
**in the Math Dept. COMMON ROOM, Thackeray 705**