MATHEMATICS DEPARTMENT SPECIAL SEMINAR
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12:15PM - 1:05PM, ST1, ROOM 242

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Title: Physical Supersymmetry for Mathematicians.

Abstract: In particle physics, there are two fundamental classes of particles: bosons and fermions, which differ only in strategic changes of signs in their equations. Physical supersymmetry is an attempt to unify these two types of particles into a single theory. From a mathematical point of view, particles are representations of the Poincare group of isometries of Minkowski space, which consists of spacetime translations, rotations, and Lorentz transformations coming from special relativity. Poincare invariance encodes Einstein's principle that physics is the same in any inertial frame. In supersymmetric theories, we consider the super Poincare group, which introduces new generators corresponding to square roots of derivatives, and which intertwine the roles of bosons and fermions. Supersymmetry is an essential ingredient of string theory, and gives rise to interesting mathematics, such as the use of Seiberg-Witten theory in the study of 4-manifolds. This talk will introduce supersymmetry and describe the difference between "on-shell" representations, which are more familiar to mathematicians, and "off-shell" representations, which are more natural in physics.