DIFFERENTIAL GEOMETRY/PDE SEMINAR

FRIDAY, FEBRUARY 11, 2005
PADELFORD C-401
2:30 PM
(NOTE: SPECIAL DAY, TIME AND ROOM!)

Geometric optics and the wave equation on manifolds with corners

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I will describe the propagation of smooth (C^∞) and Sobolev singularities for the wave equation on smooth manifolds with corners M equipped with a Riemannian metric g. That is, for $X = M \times \mathbb{R}_t$, $P = D_t^2 - \Delta_M$, and $u \in H^1_{loc}(X)$ solving $Pu = 0$ with homogeneous Dirichlet or Neumann boundary conditions, the appropriate wave front set $\mathrm{WF}_{\mathrm{b}}(u)$ of u is a union of maximally extended generalized broken bicharacteristics. Since the latter follow the rules of geometric optics, i.e. those of classical dynamics, this result is a facet of the classical-quantum correspondence, namely that singularities of solutions of the wave equation follow geometric optics. This result is a smooth counterpart of Lebeau's results for the propagation of analytic singularities on real analytic manifolds with appropriately stratified boundary.

I will indicate the key ideas of the proof, such as microlocalization with respect to the appropriate ps.d.o. algebra, $\Psi_{\mathrm{b}}(X)$, and gaining b-regularity (i.e. conormal regularity) relative to $H^1_{loc}(X)$ via positive commutator estimates. Certain aspects of this problem are related to N-body scattering.

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