Fillable CR-structures, gluing, and the index theorem

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Abstract :

A problem of great current interest in symplectic topology concerns the ways in which a compact 3-dimensional contact manifold can be realized as the boundary of a symplectic, or Stein manifold. In this talk we consider the problem of Stein fillings from the perspective of analysis. The space of such fillings has a natural stratification defined by a spectral invariant, called the relative index, of the CR-structure on the boundary induced from the complex structure of the Stein filling. Using a sub-elliptic boundary condition for the Spinc-Dirac operator, we give a formula expressing this relative index in terms of the fundamental analytic and topological invariants of the filling manifold. This is a special case of a new, rather general, index formula, which includes the Atiyah-Singer formula as another special case.