ZHONGSHAN AN, University of Connecticut
Initial boundary value problem of the vacuum Einstein equations

In general relativity, spacetime metrics satisfy the Einstein equations, which are wave equations in the harmonic gauge. The Cauchy problem for the vacuum Einstein equations has been well-understood since the work of Choquet-Bruhat. For an initial data set satisfying the vacuum constraint equations, there exists a solution to the vacuum Einstein equations and it is geometrically unique in the domain of dependence of the initial surface. On contrast, the initial boundary value problem (IBVP) has been much less understood. To solve for a vacuum metric in a region with time-like boundary, one needs well-posed boundary conditions to guarantee geometric uniqueness of the solution. However, due to gauge issues occurring on the boundary, there has not been a satisfying choice of boundary conditions. In this talk I will discuss obstacles in establishing IBVP for the vacuum Einstein equations and some progress based on joint works with Michael Anderson.