- **Scattering theory calculations of Casimir energies**
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  At short distance scales, quantum-mechanical fluctuations of charges and fields give rise to Casimir forces, which play an important role both in fundamental physics and in applications to micro-electromechanical devices. Recent advances in experimental technology have motivated a wide range of efforts to extend Casimir's original calculation of the force between uncharged parallel conducting plates to a variety of other situations. I will describe a set of techniques for calculating these forces based on scattering theory, which is applicable to a wide range of geometries and materials. In this approach, the Casimir interaction energy for a collection of objects can be expressed in terms of the scattering T-matrices for each object individually, combined with universal translation matrices describing the objects' relative positions and orientations. These translation matrices are derived from an expansion of the free Green's function in an appropriate coordinate system, independent of the details of the objects themselves. This method proves particularly valuable for geometries involving high curvature, such as edges and tips. I will describe this approach in general terms, give results from problems to which it has been applied successfully, and summarize new developments in scattering theory that have been motivated by these calculations.