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Intertwining classical and quantum mechanics on hyperbolic surfaces

The well known Egorov theorem in microlocal analysis says that the conjugate $U(-t)AU(t)$ of a pseudo-differential operator A by the wave group or Schrodinger group $U(t)$ is another pseudo-differential operator whose principal symbol is $\sigma_A \circ g^t$ where σ_A is the principal symbol of A and g^t is the geodesic flow. Very rarely does it happen that the conjugation is exact, i.e. without remainder terms, and it depends on how one quantizes symbols to operators. My talk, joint work with Nalini Anantharaman, is about an exact Egorov theorem on hyperbolic surfaces. We construct an explicit intertwining operator L which conjugates the wave group and geodesic flow. Equivalently, L maps Wigner distributions to certain explicit eigendistributions of the geodesic flow, which we call Patterson-Sullivan distributions.