

**Dynamics and scattering of truncated coherent states
on the star-graph in the semiclassical limit.**

Claudio Cacciapuoti

Università degli Studi dell'Insubria

claudio.cacciapuoti@uninsubria.it

Davide Fermi

Scuola Normale Superiore

davide.fermi@sns.it

Andrea Posilicano

Università degli Studi dell'Insubria

andrea.posilicano@uninsubria.it

We consider the dynamics of a quantum particle of mass m on the star-graph constituted by n half-lines with a common origin. The generator of the dynamics is the Hamiltonian $H_K = -(2m)^{-1}\hbar^2\Delta$ with Kirchhoff conditions in the vertex, \hbar is the reduced Planck constant. Our aim is to obtain the semiclassical limit of the quantum evolution, generated by H_K , of an initial state resembling a coherent state (gaussian packet) concentrated on one of the edges of the graph. Due to the Kirchhoff conditions in the vertex, the corresponding classical dynamics on the graph cannot be described by Hamilton-Jacobi equations. For this reason, we define the classical dynamics through a Liouville operator on the graph, obtained by means of the Krein's theory of singular perturbations of self-adjoint operators. For the same class of initial states, we study also the semiclassical limit of the wave and scattering operators for the couple H_K and H_D , where H_D is the free Hamiltonian with Dirichlet conditions in the vertex.