1115-35-144 **Antonella Marini*** (marini@yu.edu), **Vincent Moncrief** (vincent.moncrief@yale.edu) and **Rachel Maitra** (maitrar@wit.edu). *Euclidean signature semi-classical methods for bosonic field theories.*

Elegant 'microlocal' methods have been extensively developed for the analysis of conventional Schrödinger eigenvalue problems. For technical reasons though these have not been applicable to quantum field theories. In this article we initiate a *Euclidean-signature semi-classical*) program to extend the scope of these analytical techniques to encompass the study of self-interacting scalar fields. The basic microlocal approach entails the solution of a single, nonlinear equation of Hamilton-Jacobi type followed by the integration (for both ground and excited states) of a sequence of *linear* 'transport' equations along the 'flow' generated by the 'fundamental solution' to the Hamilton-Jacobi equation. Using a combination of the direct method of the calculus of variations, elliptic regularity theory and the Banach space implicit function theorem we establish the existence, uniqueness and global regularity of the 'fundamental solution' to the relevant, Euclidean-signature Hamilton-Jacobi equation for the systems under study. Our methods are applicable to (massive) scalar fields with polynomial self-interactions as well as to Yang-Mills fields in $2 + 1$ and $3 + 1$ dimensions. (Received September 13, 2015)