Abstract Submitted
for the APR21 Meeting of
The American Physical Society

Hidden symmetries for transparent de Sitter space IAN MORRISON, West Chester University — It is known that odd-dimensional de Sitter space acts as a transparent potential for free fields. Previous studies have explained this phenomena by relating de Sitter free field equations of motion to the time-independent Schrdinger equation with known transparent potentials. In this work we show that de Sitters transparency is a consequence of an infinite set of hidden symmetries. These symmetries arise from an accidental symmetry for the zero-mode of matter fields, as well as the boost isometry of de Sitter space. For simplicity, we consider the case of massive KleinGordon theory. We show that the Noether charges associated with these hidden symmetries distinguish the two linearly-independent solutions of the free field wave equation in the asymptotic past and future of de Sitter. Conservation of these charges requires that the asymptotic behavior of any solution be identical, up to a constant phase, in the future and the past, which is the property of transparency. In the quantized theory, these charges act trivially on particle states belonging to the in/out vacuum Fock space. For particle states constructed from other vacua, the action of the charges generates particles.

Ian Morrison
West Chester University

Date submitted: 07 Jan 2021 Electronic form version 1.4