Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Spatial and temporal localization of light in two dimensions ROMAIN BACHELARD, Instituto de Fsica de So Carlos/Universidade de So Paulo — Despite decades of active research, punctuated by several contradictory experimental and theoretical claims, the mere existence of Anderson localization of light, a regime where light cannot propagate due to interference effects between randomly distributed scatterers, has not been demonstrated yet. Recent theoretical works suggest that the vectorial nature of light might actually prohibit localization. We here present a study on the scattering of light in two dimensions, a regime where both scalar or as a vectorial electromagnetic waves coexist. The scaling analysis reveals that although both kinds of wave present long-lived subradiant modes, only scalar ones do localize, supporting the theoretical claim in 3D. Yet we also observe a lack of correlation between lifetimes and localization length, calling for a differentiation between temporal (subradiant) and spatial (Anderson) localization. Finally, we discuss the implication of localization, following the original idea that the localization of the modes induces a metal to insulator transition, bringing transport to a halt. Indeed, in the case of light, the scattering is characterized by the presence of a few long-range (superradiant) modes, which appear to alter dramatically the transport properties.

Romain Bachelard
Instituto de Fsica de So Carlos/Universidade de So Paulo

Date submitted: 29 Oct 2015 Electronic form version 1.4