Condensed Matter Seminar

Friday

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4:30 P.M.

Rm 184 NSH

Interplay of Superradiance and disorder: a mobility edge in the imaginary axis

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Anderson localization of light in three dimensions has challenged experimental and theoretical research for the last decades. Localization of light in cold atomic systems presents strong differences from the standard problem of localization since one needs to deal with an open quantum wave problem in presence of long range hopping which induces strong cooperative effects, such as super and subradiance. Contrary to common believe, we show that localization of light is possible in the dilute regime for subradiant states. Additional disorder in atomic transition frequencies leads to the emergence of a mobility edge in the immaginary axis, independent of the real energy. The existence of a critical lifetime above which subradiant Dicke states are localized appears as a general feature of scalar wave localization. A preliminary analysis also indicates that the localization length diverges as a power law at such critical lifetime.

References
[1] Shielding and localization in the presence of long-range hopping. , G. L. Celardo, R. Kaiser and F. Borgonovi, Phys. Rev. B 94, 144206 (2016).
[2] Cooperative Shielding in Many-Body Systems with Long-Range Interaction , L. Santos, F. Borgonovi and G.L.Celardo, Phys. Rev. Lett. 116, 250402 (2016).
[3] Giuseppe Luca Celardo, Mattia Angeli, Robin Kaiser,arXiv:1702.04506

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