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Entangled optical clocks via Rydberg blockade PETER KOMAR, Harvard University, ERIC KESSLER, Harvard University, ITAMP, TURKER TOPCU, ANDREI DEREVIANKO, University of Nevada, Reno, MIKHAIL LUKIN, Harvard University — We present an analysis of a protocol for creating fully entangled GHZ-type states of atoms in spatially separated optical atomic clocks. In our scheme, local operations make use of the strong dipole-dipole interaction between Rydberg excitations, which give rise to fast and reliable quantum operations involving all atoms in the ensemble. The necessary entanglement between distant ensembles is mediated by single-photon quantum channels and collectively enhanced light-matter couplings. These techniques can be used to create the recently proposed quantum clock network based on neutral atom optical clocks [1]. We specifically analyze the realization of this scheme based on neutral Yb atoms.

[1] Komar et al, Nature Physics 10, 582-587 (2014)

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