

Condensed Matter Physics in Big Discrete Time Crystals in a BEC

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Discrete time crystals created in a Bose-Einstein condensate of ultracold atoms bouncing on an oscillating mirror [1] can exhibit dramatic breaking of time-translation symmetry [2, 3], allowing the creation of discrete time crystals having tens of temporal lattice sites and suitable for hosting a broad range of condensed matter phenomena in the time dimension [4].

We will discuss temporal condensed matter phenomena including Anderson and many-body localisation due to temporal disorder, topological time crystals and quasi-crystalline structures in time. We will also discuss the construction of two-dimensional time lattices involving a BEC bouncing between two oscillating mirrors oriented at 90-degrees and at 45-degrees. The latter configuration can support a versatile Möbius strip geometry which can host a variety of two-dimensional time lattices including a honeycomb time lattice and a Lieb square time lattice [5].

References:

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