

# Gordon Research Seminar in Particle Physics: Pushing the Frontiers of Particle Physics During the LHC Run II Era

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## Disassembling the clockwork mechanism

*Saturday, June 24, 2017 8:00 PM (15 minutes)*

The original clockwork theories (1511.00132 and 1511.01827) comprise an  $N$ -site quiver of  $N$  axions, with symmetry breaking interactions arranged between them to leave a single massless mode with exponentially suppressed and (lattice) position dependent couplings to different sites. We study both clockwork's group-theoretic generalisation to quivers with different symmetry groups, and also its continuum limit (i.e. the possibility of obtaining the quiver from the deconstruction of a 5D theory). Contradicting some existing statements in the literature, we find that 'clockwork' is a strictly Abelian phenomenon (ruling out clockwork theories of composite Higgses and gravitons), and that it is realised in 5D by a bulk field in flat space with bulk and brane mass terms to localise its zero mode (it cannot be realised by a massless bulk field, regardless of the choice of warp factors in the metric).

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**Session Classification:** The "energy frontier": LHC and future colliders