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Correlated States and Nuclear Reactions: an Experimental Test with Low Energy Beams

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An experimental programme is described in this paper, aiming at detecting the formation of correlated coherent states (CCS) in thin surface layers of crystals, when bombarded by a very low energy proton/deuteron beam.

CCS are a generalization of “non-classical” states of light, such as the coherent and squeezed states, whose existence has been demonstrated long ago, giving rise to the remarkable development of Quantum Optics. In other fields, ranging from Condensed Matter physics to Cosmology, such states have been intensively studied, but a clear signature of their existence is still lacking.

This may be a clue to various unexplained phenomena, including the strong enhancement of nuclear fusion reaction rates in metal environments, which have been reported on by several experiments, and cannot be accounted for by electron screening only.

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