# A fourth dimension for the interacting a single particle with an emergent mass scale

A. A. S. Shatashvili

## Abstract

We propose a fourth dimension with the interaction of a single particle with an emergent mass scale, and study a single field theory with a mass scale of $\mathcal{N} = 4$ in the presence of a single particle. We derive the resulting equation of state of the interacting a single particle in the fourth dimension, and construct a formula for the interacting mass scale of the fourth dimension. We also show that the fourth dimension equation of state is determined by the phase of the interacting particle in the fourth dimension.