Title: Are the axion-like particles related to the neutrino mass generation?

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Abstract:

Light pseudoscalars known as axion like particles (ALPs) may be behind physical phenomena like the Universe transparency to ultra-energetic photons, the soft X-ray excess from the Coma cluster, and the 3.5keV line. We explore the connection of these particles with the inverse seesaw (ISS) mechanism for neutrino mass generation. We propose a very restrictive setting where the scalar field hosting the ALP is also responsible for generating the ISS mass scales through its vacuum expectation value on gravity induced nonrenormalizable operators. A discrete gauge symmetry protects the theory from the appearance of overly strong gravitational effects and discrete anomaly cancellation imposes strong constraints on the order of the group. The anomalous U(1) symmetry leading to the ALP is an extended lepton number and the protective discrete symmetry can be always chosen as a subgroup of a combination of the lepton number and the baryon number.