

# JOINT TUFTS/MIT COSMOLOGY SEMINAR

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## *From axion inflation to leptons, baryons and cosmological magnetic fields*

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Axions are attractive candidates for theories of large-field inflation that are capable of generating observable primordial gravitational wave backgrounds. These fields enjoy shift-symmetries that protect their role as inflatons from being spoiled by coupling to unknown UV physics. This symmetry also restricts the couplings of these axion fields to other matter fields. At lowest order, the only allowed interactions are derivative couplings to gauge fields and fermions. These derivative couplings lead to the biased production of fermion and gauge-boson helicity states during and after inflation. I will describe some recent work on preheating in axion-inflation models that are derivatively coupled to Abelian gauge-fields and fermion axial-currents. For an axion coupled to U(1) gauge fields it was found that preheating is efficient for a wide range of parameters. In certain cases the inflaton is seen to transfer all its energy to the gauge fields within a few oscillations. Identifying the gauge field as the hypercharge sector of the Standard Model can lead to the generation of cosmologically relevant magnetic fields. Coupling the inflaton-axion to Majorana fermions leads to the biased production of fermion helicity-states which can have interesting phenomenological implications for leptogenesis.

Tuesday, April 11, 2017, 2:30 pm  
Cosman Seminar Room  
Center for Theoretical Physics  
Building 6C, Room 6C-442  
Massachusetts Institute of Technology  
Refreshments at 2:00 in the same room