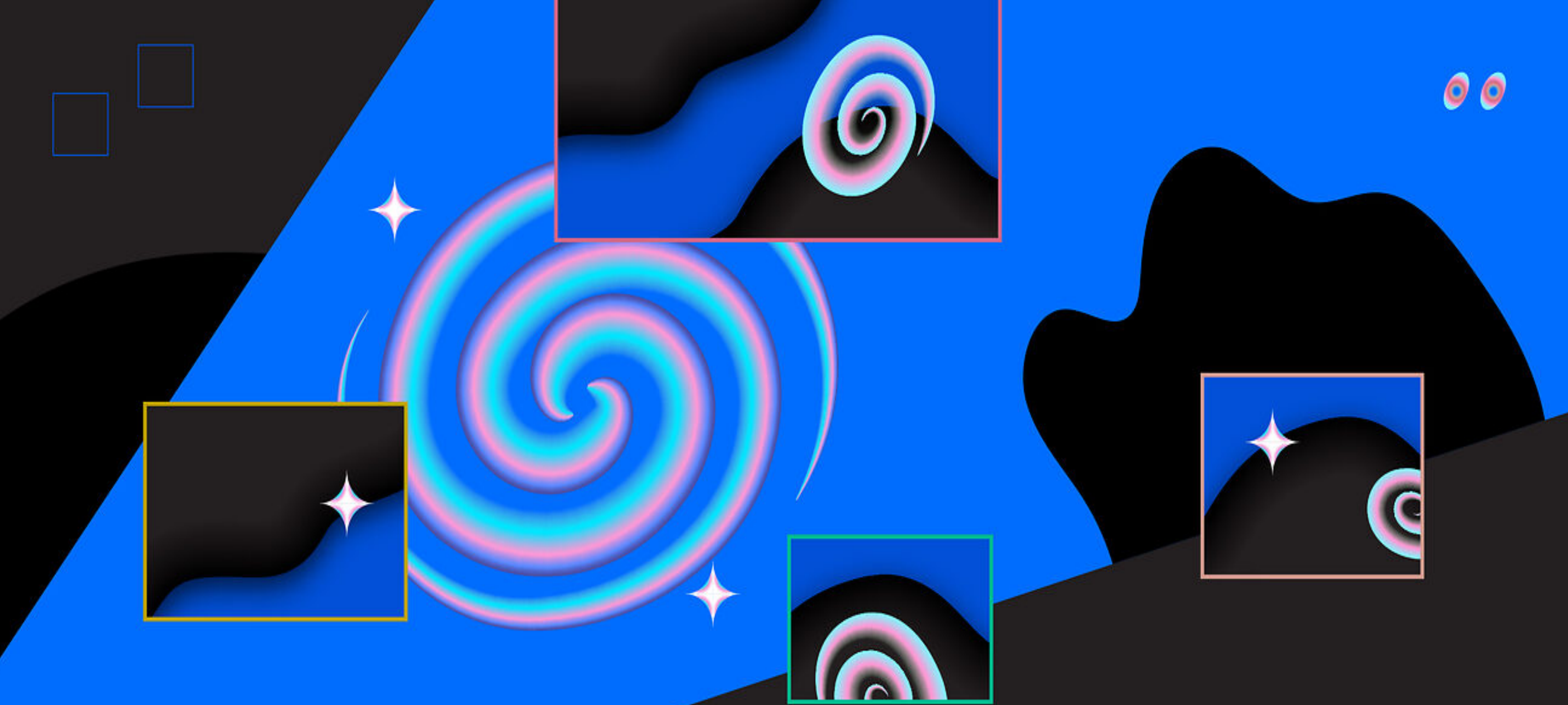




PARTICLE DARK MATTER WITH THE SKA

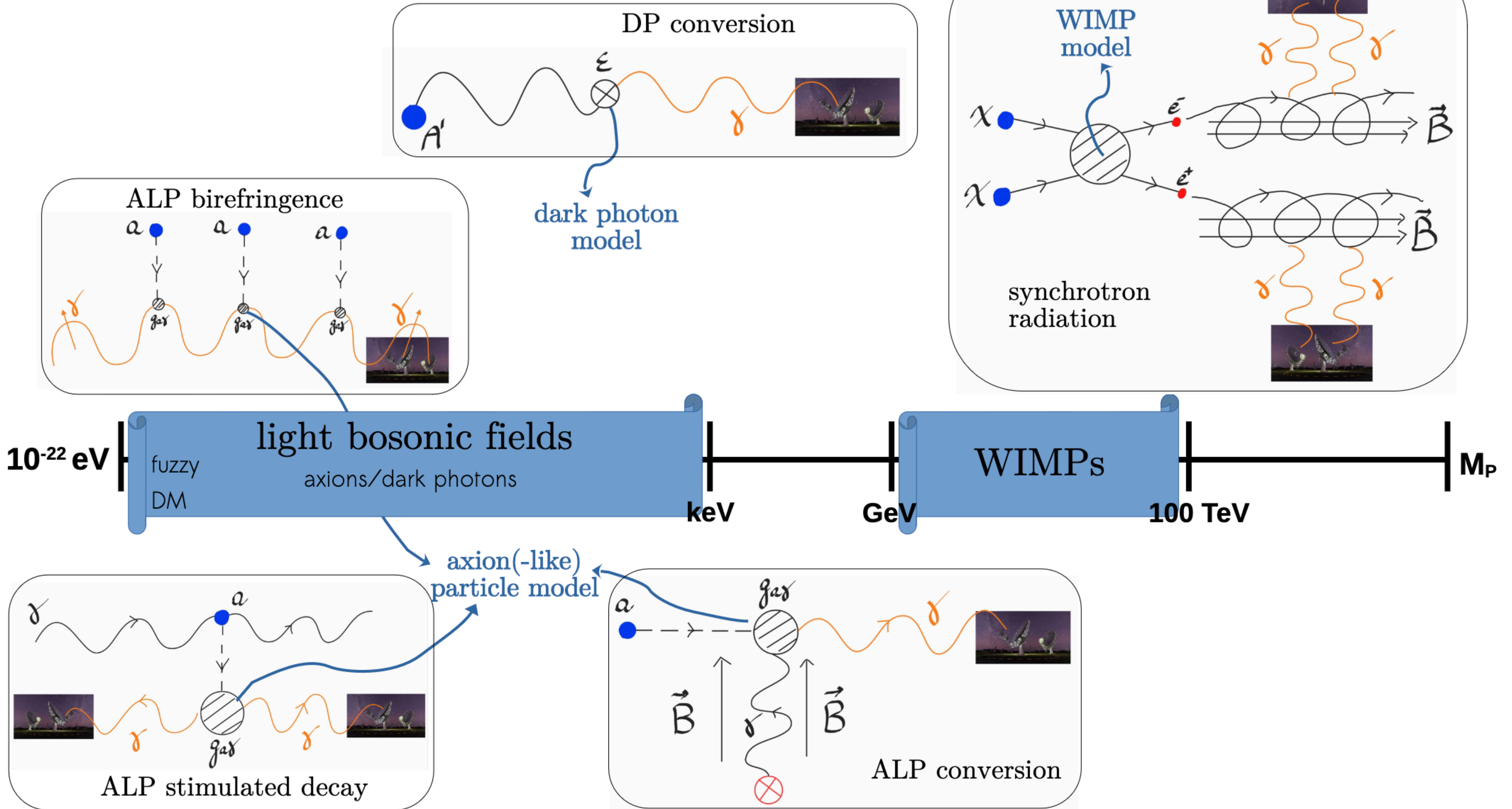
Emma Tolley, EPFL, Swiss SKA Days 2026



Probing the Fundamental Nature of Particle Dark Matter

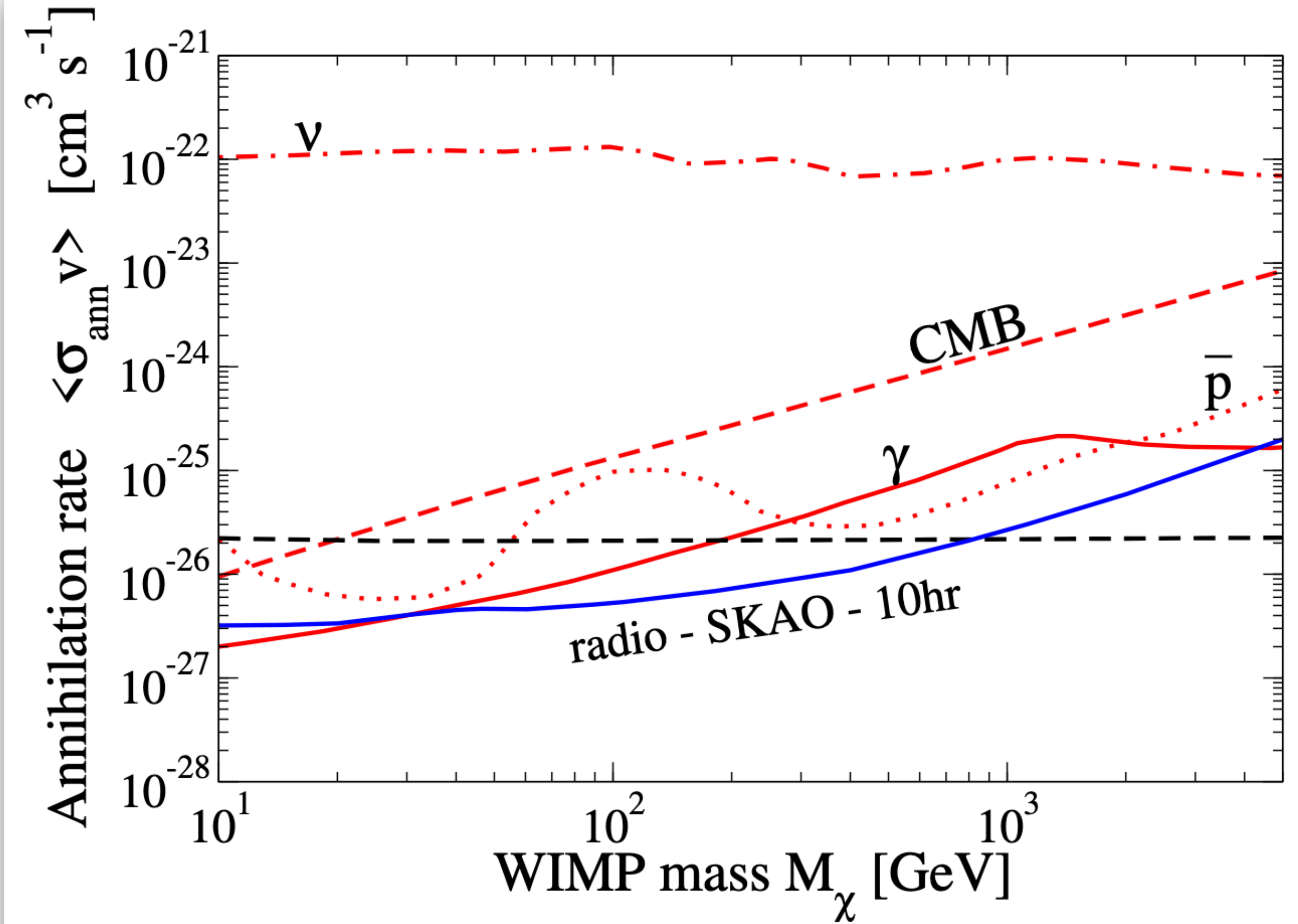
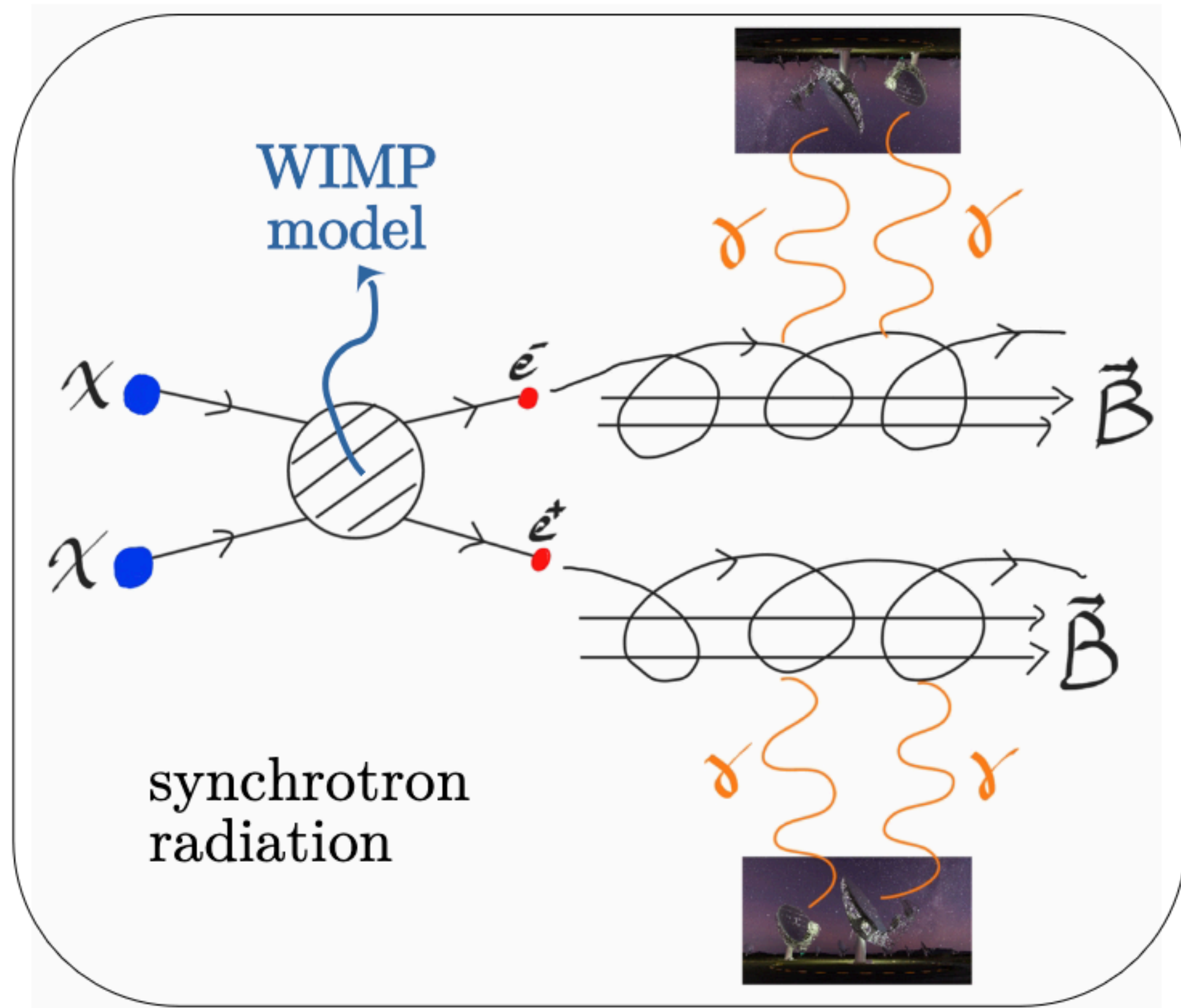
Marco Regis^{1,2} Aritra Basu^{3,4} Geoff Beck⁵ Gianni Bernardi^{6,7,8} Paolo Marchegiani⁹ Dominik J. Schwarz¹⁰ Marco Taoso² Elisa Todarello^{1,11,12} Emma Tolley¹³ and Cora Uhlemann¹⁰

OVERVIEW



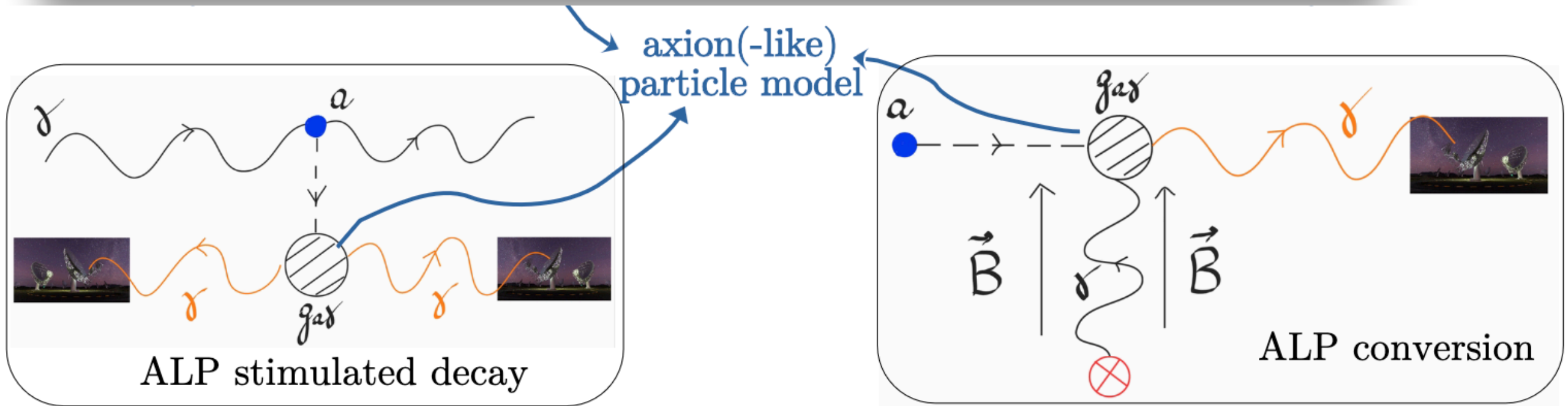
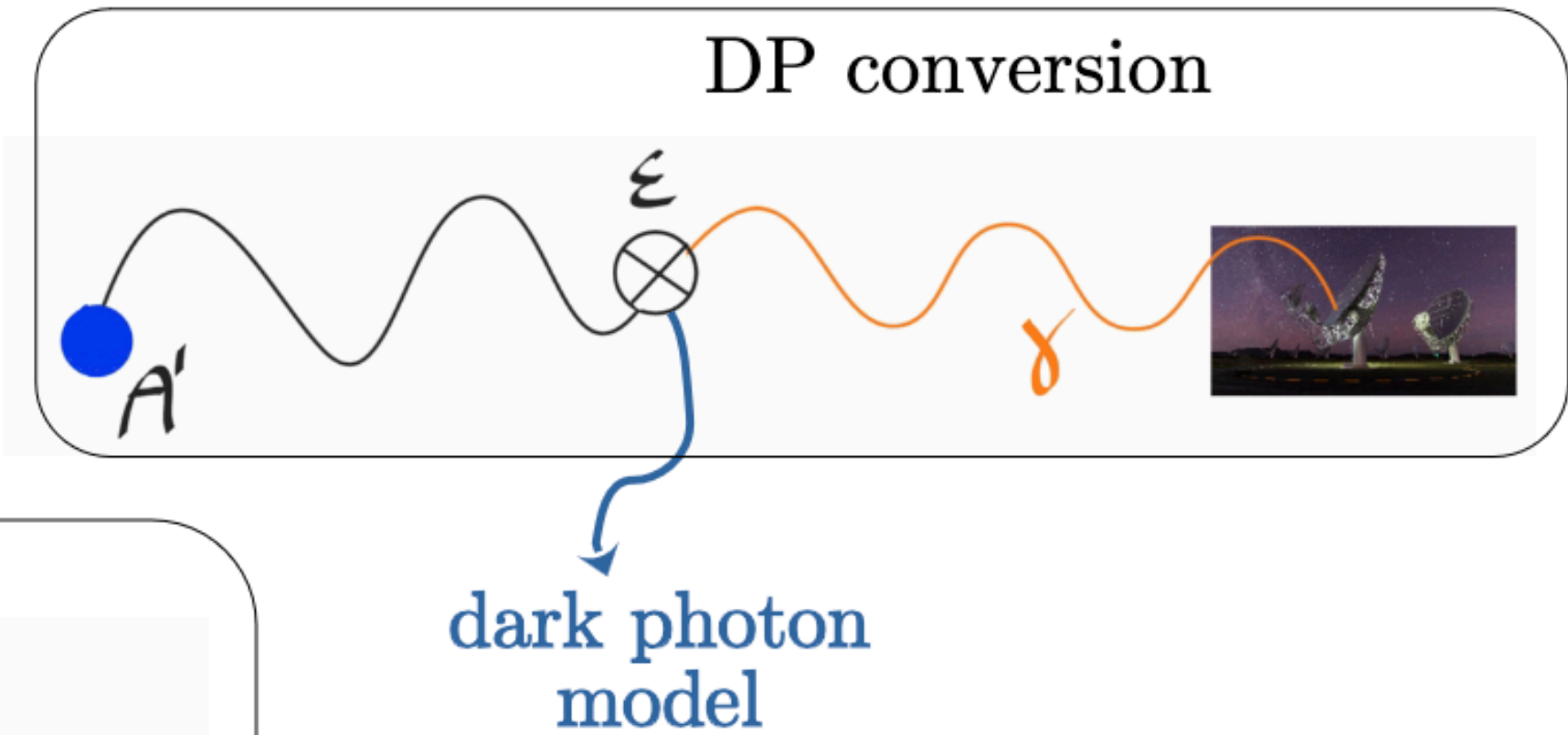
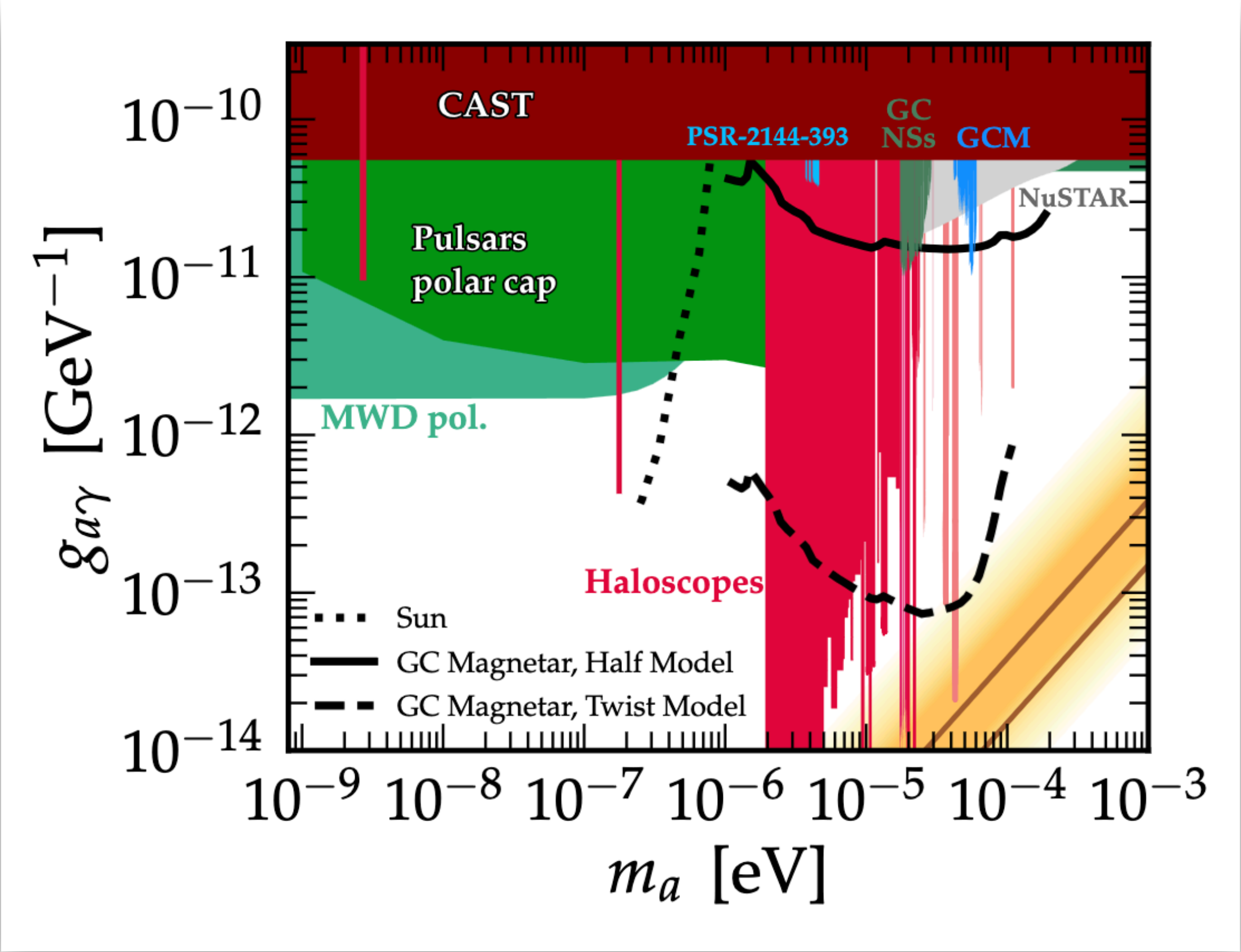
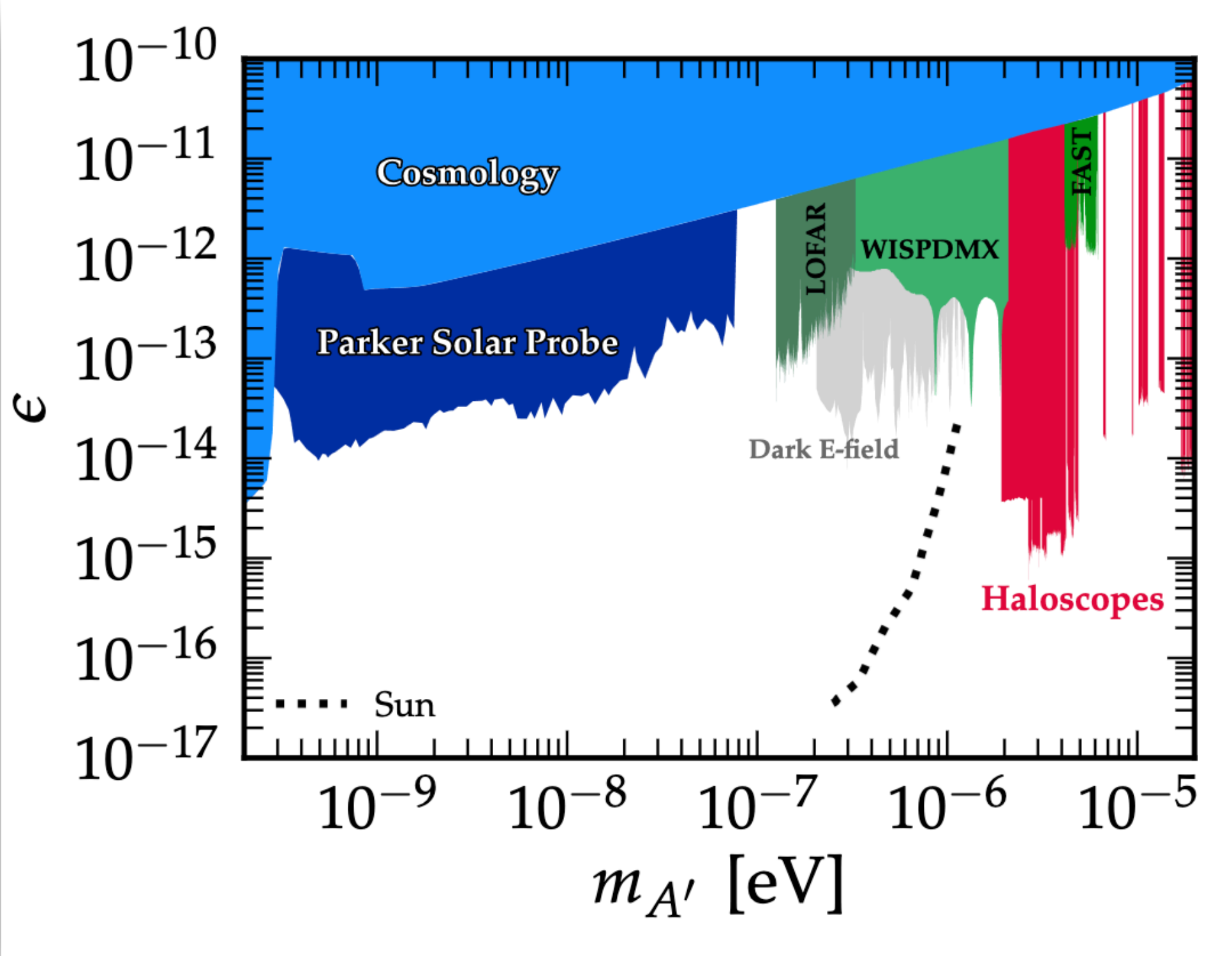
WIMP ANNIHILATION

Look for heavy DM annihilating into SM particles & associated synchrotron radiation



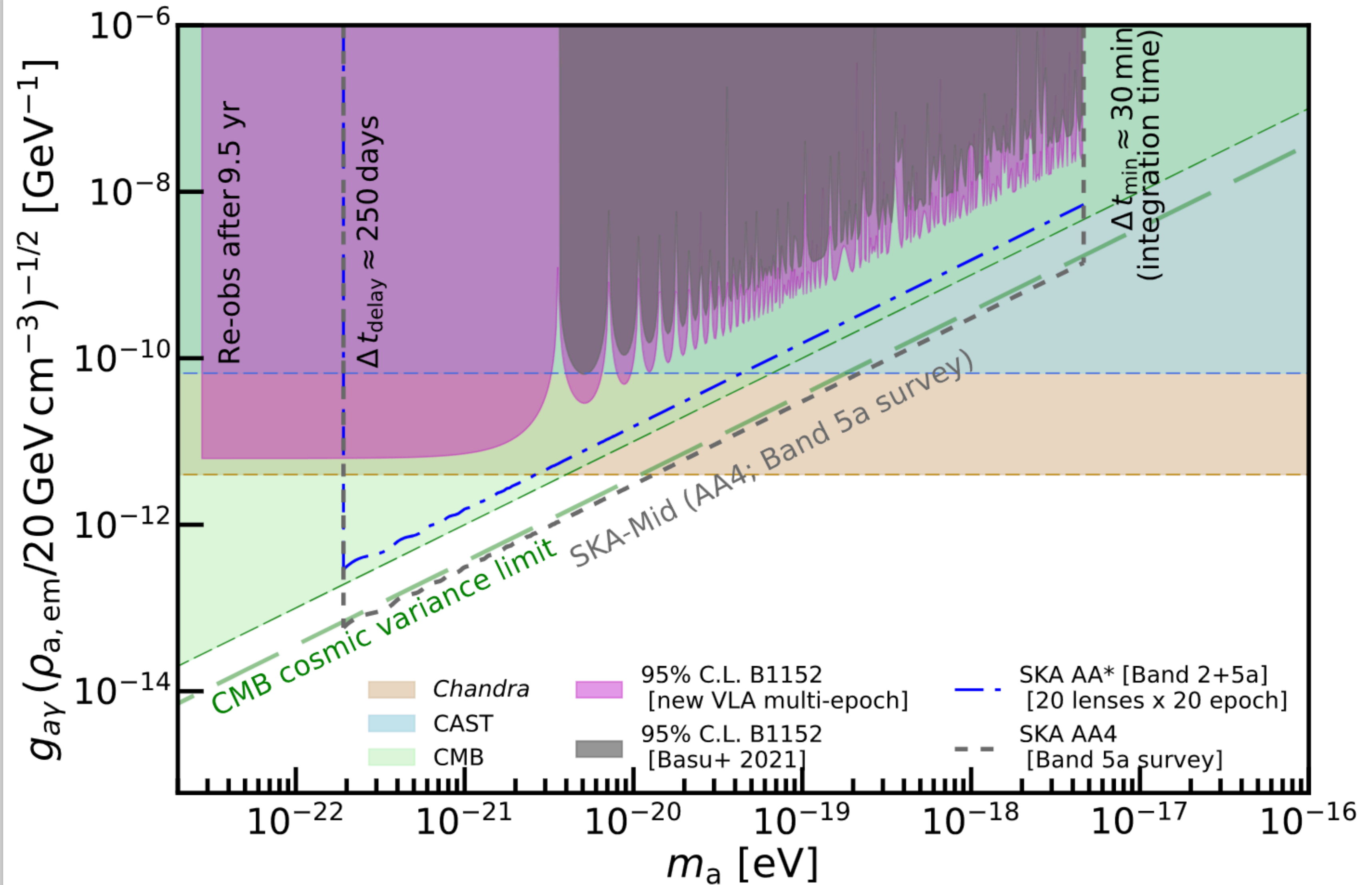
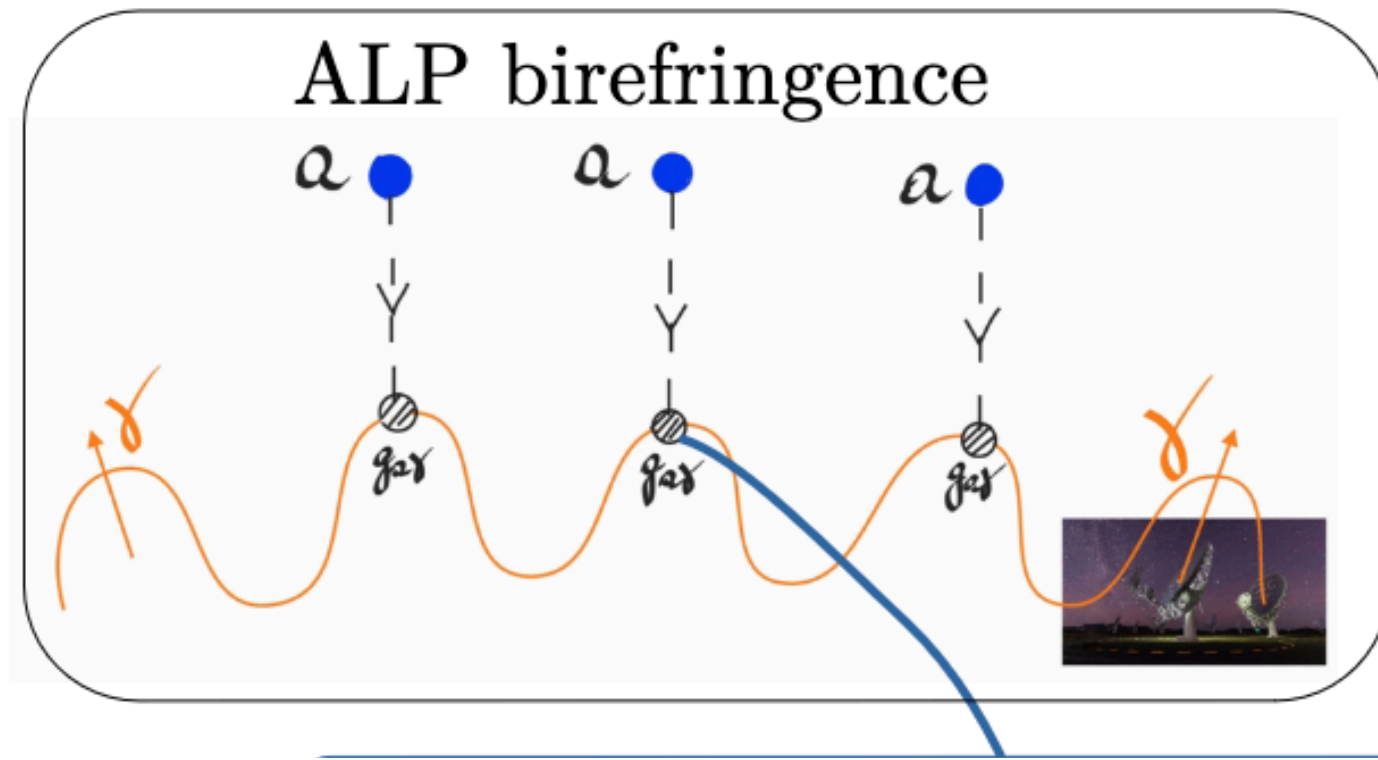
ALP & DARK PHOTON EMISSIONS

Look for narrow radioband radio signals coming from DM decay or conversion,



ALP BIREFRINGENCE

Look for rotation of linearly polarized light



SUMMARY

DM candidate	signature	observation type	observation targets	key SKAO requirements
WIMP	synchrotron	continuum	Milky-Way satellites, galaxy clusters, GC	short baselines
ALP	birefringence	continuum/ spectro-polarimetry	quasars, AGN, strong lensing	polarization, long baselines, monitoring
ALP	stimulated decay	spectral line	see WIMPs, + echoes of bright sources	spectral resol., short baselines
ALP Dark photon	conversion	spectral line continuum/transient	neutron stars, Sun pulsars	spectral resol. time resol.