

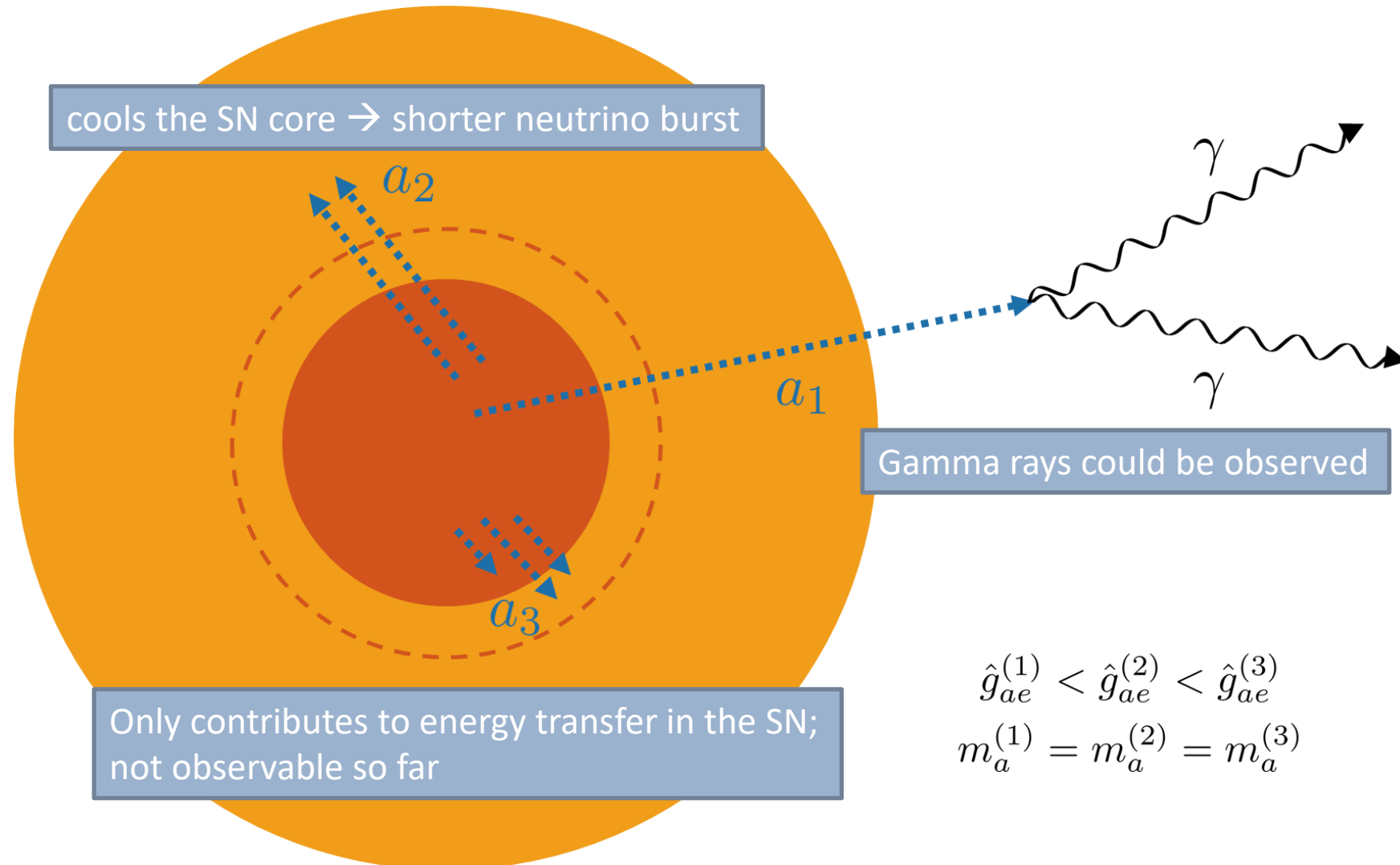
# Some background information

- My research is focused on the theory & phenomenology of **axionlike particles**
- I am a PhD student in Stockholm, my supervisor is David Marsh
- Will graduate by the end of the year
- Some earlier work on millicharged DM models (as Master student)

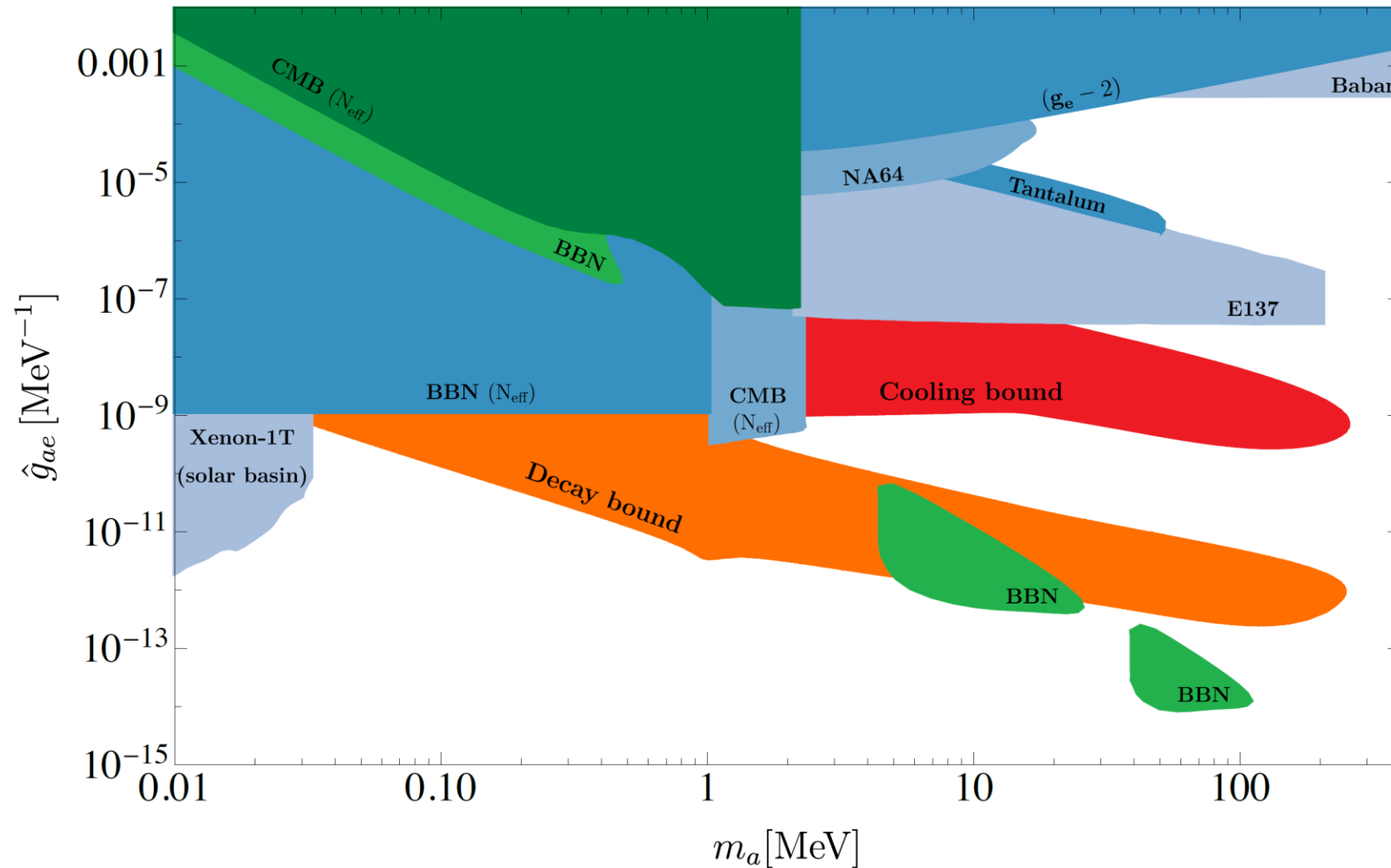
# Astroparticle pheno of ALPs

1. ALPs can be copiously produced in many astrophysical environments such as supernovae  
→ What can we learn about the ALP EFT from SNe?  
(2205.07896, 2304.01060)
2. What influence can loops in the ALP EFT have on astrophysics? (also 2304.01060, 2202.08858)
3. How should we model magnetic fields to study the possible ALP-photon conversion? (2208.04333)

# ALPs from SNe

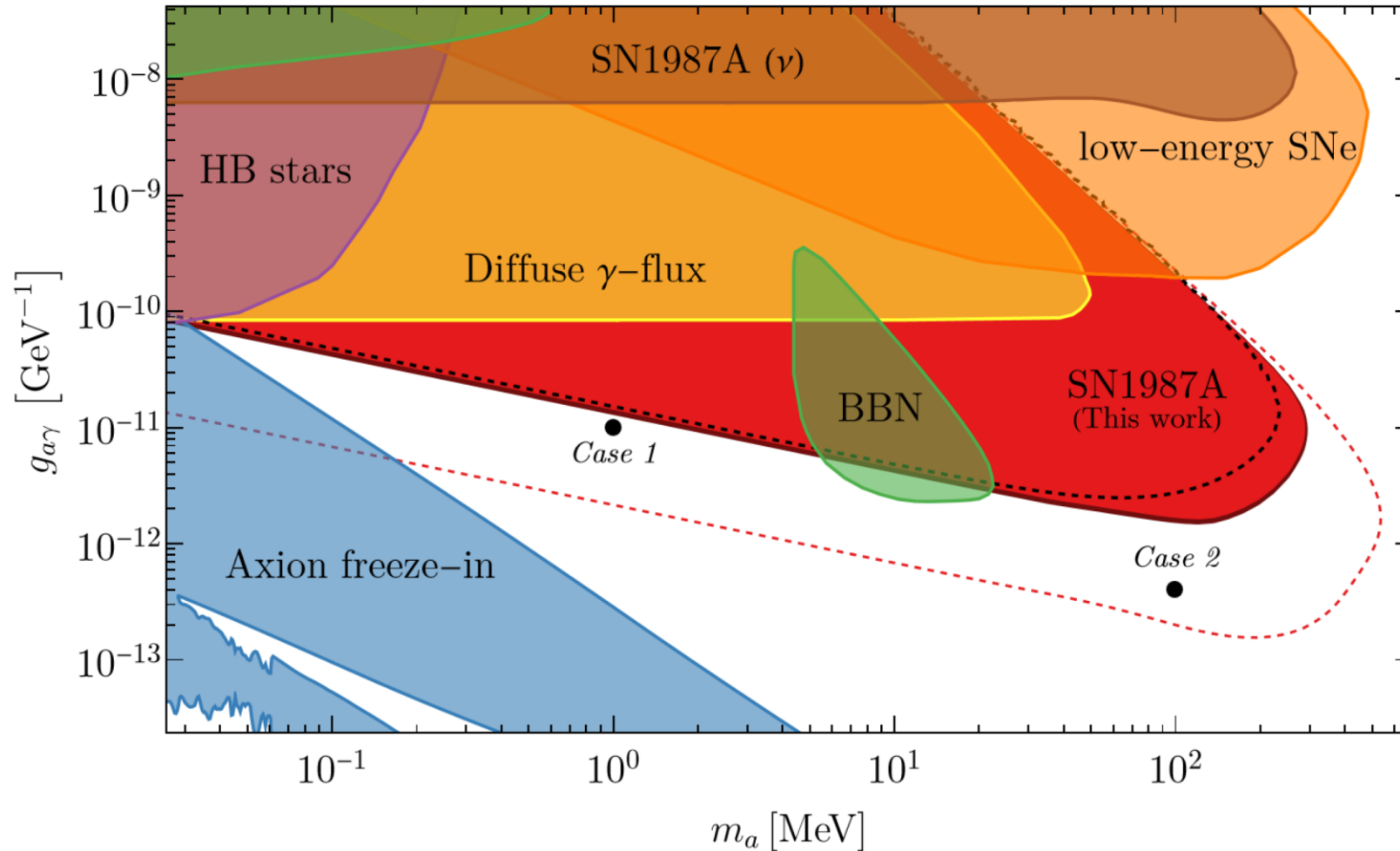


# ALPs from SNe: coupling to electrons



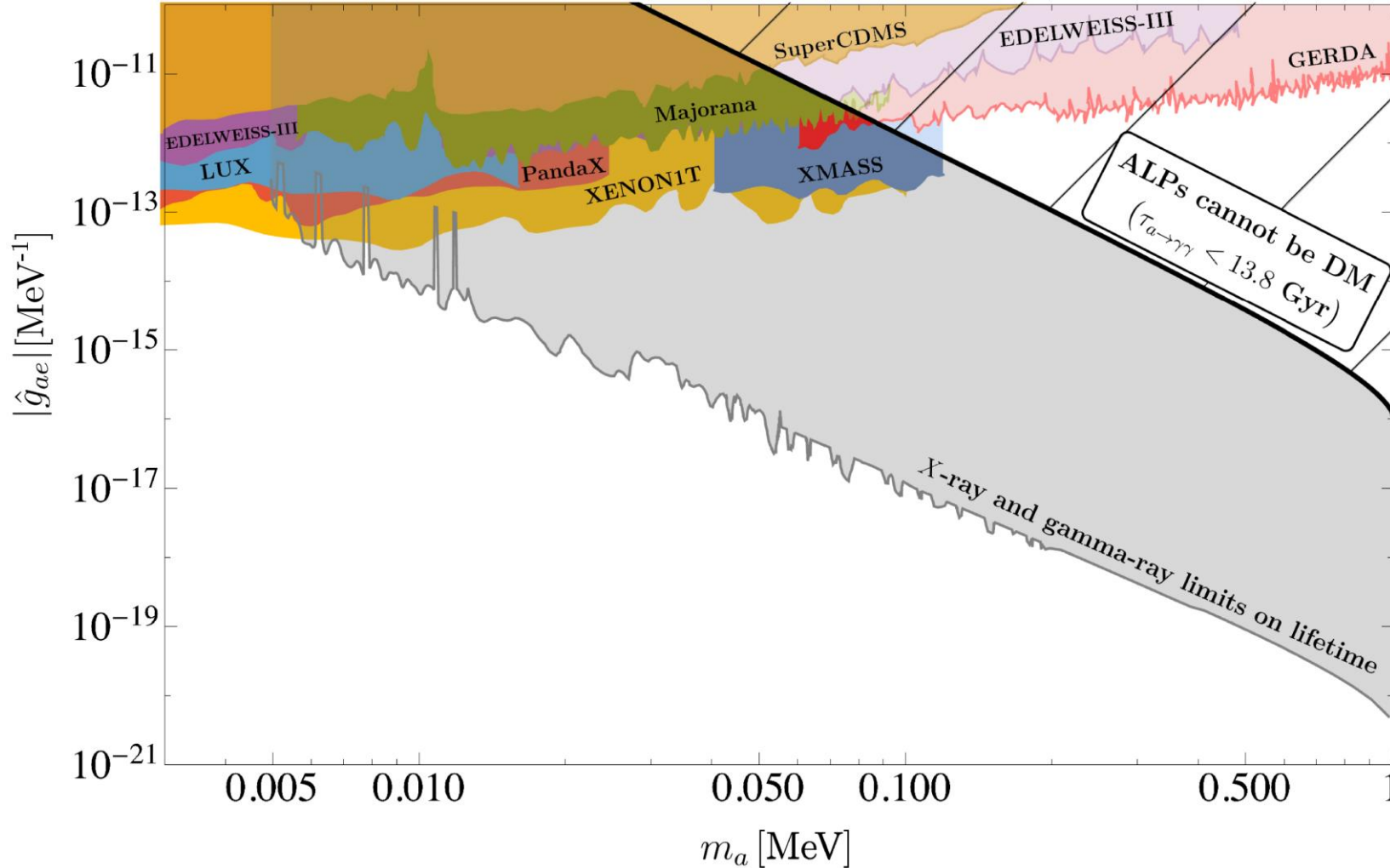
Ricardo Ferreira,  
David Marsh, EM:  
2205.07896

# ALPs from SNe: coupling to photons

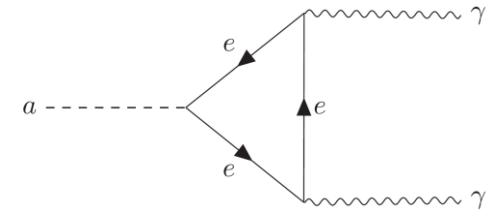


EM, Christopher Eckner,  
Francesca Calore, Pierluca  
Carenza, David Marsh:  
2304.01060

# Decays of ALP dark matter into photons



This is a quantum loop effect!



Ricardo Ferreira, David Marsh, EM:  
2202.08858

# Future plans and interests

- Use my fast code to calculate ALP production in SNe for all couplings and bounds (e.g. ALP-muon interactions, calorimetric bound from low energy SNe)
- Thermal QFT in the SN core: are ALP-lepton interactions treated the right way? Do thermal effects modify loop-induced couplings significantly?
- Where else could energy-dependent loop-induced ALP couplings be relevant? E.g. collider phenomenology