

Indirect search for DM bound state formation

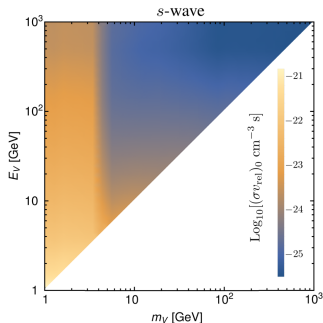
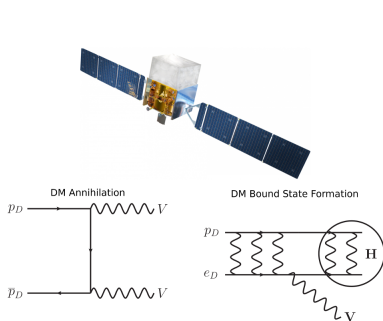
Iason Baldes

In collaboration with F. Calore, K. Petraki, V. Poireau, N. Rodd
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Quarkonia meet Dark Matter
15-18 June 2020

Fermi limit from dwarfs for dark QED dark matter



Assuming a ρ_{DM}^2 dependence on the flux

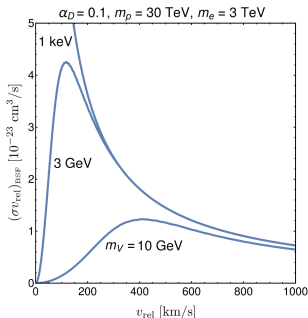
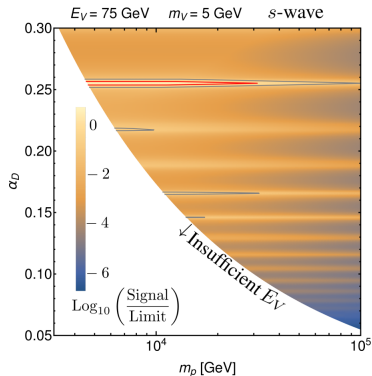
We set generic constraints on the dark photon flux (amplitude $\propto \sigma_0 v_{\text{rel}}$) as a function of m_v and E_v . Results available as a table.

(With same amount of work as deriving the constraint in terms of m_v and M_{DM} .)

- For DM annihilation $E_v \simeq M_{\text{DM}}$.
- For bound state formation $E_v \simeq$ binding energy.

Limit on Bound State Formation

We can use our constraint for bound state formation/level transitions in this and related models with dark photons.



The observed flux

$$\frac{d\Phi_\gamma}{dE} = \left[\frac{f^2 (\sigma v_{\text{rel}})_0}{4\pi (fm_p + fm_e + [1-f]m_H)^2} \right] \frac{dN}{dE_\gamma} J$$