

Dark Matter Annihilation via Breit-Wigner Enhancement with Heavier Mediator

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We propose a new scenario that both the dark matter freeze-out in the early Universe and its possible annihilation for indirect detection around a supermassive black hole are enhanced by a Breit-Wigner resonance. With the mediator mass larger than the total initial dark matter mass, this annihilation is almost forbidden at late times. Thus, the stringent cosmic microwave background and indirect detection constraints do not apply. However, a supermassive black hole can accelerate the dark matter particles to reactivate this resonant annihilation whose subsequent decay to photons leaves a unique signal. The running Fermi-LAT and the future COSI satellites can test this scenario.

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