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Gamma lines and cosmic continuum from DM decay

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We show that there exists only a quite limited number of higher dimensional operators which can naturally lead to a slow decay of dark matter particles into monochromatic photons. As each of these operators inevitably induces decays into particles other than photons, we show that the gamma-lines it induces are always accompanied by a continuum flux of cosmic rays. Hence constraints on cosmic-ray fluxes imply constraints on the intensity of gamma-lines and vice-versa. A comparison with up to date observational bounds shows the possibilities to observe or exclude cosmic rays associated to gamma-line emission, so that one could better determine the properties of the DM particle, possibly discriminating between some of the operators.

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