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Complementary constraints on light dark matter from heavy meson decays

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We investigate constraints on the properties of light dark matter which can be obtained from analysis of invisible quarkonium decays at high intensity electron-positron colliders in the framework of a low energy effective field theory. A matrix element analysis of all interaction structures pertinent for these bound state decays allows for a model independent calculation of associated dark matter-nucleon scattering and dark matter annihilation cross sections. Assuming dark matter couples universally to all quark flavors, we then obtain bounds on nucleon scattering which complement direct dark matter detection searches. In contrast to similar analyses of monojet searches at high energy colliders, B and charm factories are more suitable probes of light dark matter interactions with less massive mediators. Relevant bounds on dark matter annihilation arising from gamma ray searches of dwarf spheroidal galaxies are also presented.

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