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Model Independent Bounds in Direct Dark Matter Searches

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Direct searches for Dark Matter (DM) aim at detecting the nuclear recoils arising from a scattering between DM particles and target nuclei in underground detectors. Since the physics that describes the collision between DM particles and target nuclei is deeply non-relativistic, in this presentation I'll review a different and more general approach to study signal in direct DM searches based on the formalism of non-relativistic operators. Then I'll present the main observables pointing out all the uncertainties that enter in this field. Finally, since the underlying relativistic theory that describes both the DM and the standard model fields is unknown, in the last part of this presentation I'll present a new method and a self-contained set of numerical tools to derive the bounds from some current direct detection experiments on virtually any arbitrary model of DM elastically scattering on target nuclei.

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