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New Directions 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 the first part of this seminar 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 and the experimental landscape pointing out all the uncertainties that enter in this field. Finally, I'll show that a Dirac DM particle interacting with ordinary matter via the exchange of a light pseudo-scalar can accommodate the DAMA data while being compatible with all null direct DM searches.

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