Noble on the Dark Side: new ways to search directly for dark matter

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In recent decades, astronomical and cosmological observations consistently reveal that most of the Universe's matter remains hidden to even the most sensitive telescopes due to its nonluminous nature—dark matter. Exploring dark matter particles has become a tantalizing pursuit in modern physics. New-generation direct search experiments are poised to observe weak-scale dark matter particles, with successors already in planning. Simultaneously, a new era has begun for the direct detection of ever lighter dark matter candidates, leveraging novel detector designs with ultra-low detection thresholds. These advancements enable the exploration of new detection channels and unprecedentedly low dark matter masses. This presentation highlights state-of-the-art direct detection searches, emphasizing sensitivity to light dark matter, and provides an outlook on the near future of our quest for dark matter discovery in the laboratory, and more precisely at the Kirchhoff-Institute for Physics.