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Axionic waves as dark matter: potential detection with physical experiments and astronomical observations

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Axions are the best dark matter candidate, as the only one that solves a fundamental particle physics problem (the strong QCD problem) unrelated to any dark matter observation and, at the same time, naturally predicts the production of cold dark matter with a density consistent with the observed one.
A summary of detection methods is presented: in physics experiments, axions in the dark matter may be directly detected via the inverse Primakoff effect, with resonant cavities placed in strong magnetic fields; high-energy axions produced in the Sun can also be detected in the same experiments with X-ray detectors. In astronomical observations, axions produced in stars may have measurable effects for the evolution of stars, and radio observations may detect stimulated decay of axions to photon pairs. Most theories for the production of axions in the early Universe predict the formation of bound minihalos of axions with masses as low as those of asteroids, which may be detectable in special observations of gravitational lensing with advanced observatories like the James Webb Space Telescope or the Extremely Large Telescope.

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