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On the Detection of QCD Axion Dark Matter by Coherent Scattering

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In this talk, I will discuss elastic scattering processes between nucleons and the QCD axion dark matter. I point out that the cross section can be enhanced by more than $\mathcal{O}(10^{25})$ by the coherent effect, compared to classical processes. In addition, one may expect stimulated emission effects can also enhance the cross section because the number density of the axion DM is very large. The enhancement factor can be as large as another $\mathcal{O}(10^{25})$ and, if the factor exists, the force from the dark matter wind may be detected via e.g., torsion balance experiments. However, it is also found that there is a cancellation of the stimulated emission factor and the force is too small to be detected.

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