

# Fragmentation of axion-like particle dark matter and observational signatures

*Monday, 22 June 2020 13:00 (1 hour)*

**Zoom meeting:** <https://cern.zoom.us/j/7930190483> (password: see email)

**Format:** 40 minutes talk + 20 min discussion

**Virtual Axion Institute:** The discussion on this talk can be continued in Aleksandr's virtual guest office.

<https://mattermost.web.cern.ch/axions/channels/aleksandr-chatrchyan>

**Abstract:** Light scalar fields, such as axion-like particles, are appealing candidates for dark matter, if produced via the vacuum misalignment mechanism. Due to their small mass, they usually feature large field values, which can give rise to nonperturbative dynamics and fragmentation of the field soon after the onset of oscillations. We investigate this process on the example of monodromy axions, where the discrete shift symmetry is explicitly broken. We confirm the viability of such fields as dark matter for a wide range of masses. Fragmentation imprints strong overdensities in the spatial distribution of the field and we demonstrate that the small size of these fluctuations prevents their collapse into miniclusters. We also calculate the stochastic gravitational wave background that is produced from this process. In some cases the resulting signal may be within reach of future detectors, allowing a complementary probe of this type of dark matter.

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**Session Classification:** Dark matter