Contribution ID: **50** Type: **Lightning talk**

# Audible Axions

*Wednesday 13 November 2019 12:15 (5 minutes)*

Conventional approaches to probing axions and axion-like particles (ALPs) typically rely on a coupling to photons. However, if this coupling is extremely weak, ALPs become invisible and are effectively decoupled from the Standard Model. We show that such invisible axions, which are viable candidates for dark matter, can produce a stochastic gravitational wave background in the early universe. This signal is generated in models where the invisible axion couples to a dark gauge boson that experiences a tachyonic instability when the axion begins to oscillate. Incidentally,the same mechanism also widens the viable parameter space for axion dark matter. Quantum fluctuations amplified by the exponentially growing gauge boson modes source chiral gravitational waves. We discuss the parameter space where this signal can possibly be detected by pulsar timing arrays or space/ground-based gravitational wave detectors, taking into account obstructions to the tachyonic growth like kinetic mixing of the gauge boson resulting in a thermal mass.

**Authors:** RATZINGER, Wolfram (Johannes Gutenberg Universität Mainz); STEFANEK, Benjamin (JGU Mainz); SCHWALLER, Pedro Klaus (Mainz University); S. MACHADO, Camila (Mainz University)

**Presenter:** RATZINGER, Wolfram (Johannes Gutenberg Universität Mainz)

**Session Classification:** Lightning talks