Abstract Submitted
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Boradband Electric Axion Sensing Techniques for dark matter detection[1] MICHAEL TOBAR, BEN MCALLISTER, MAXIM GORYACHEV, Univ of Western Australia — Due to the inverse Primakoff effect, it has been shown that when axions interact with a DC electromagnet an AC voltage source will be produced, which oscillates at the Compton frequency of the axion [1]. In this work we use this result to calculate the sensitivity of a variety of electric sensing techniques for low-mass axions with solutions valid in the quasi-static limit. For example, we calculate the currents and voltages induced in circuits that consists of conducting wires and capacitors due to axions under a spatially varying DC $\vec{B}$-field, such as those supplied by a toroid or solenoid electromagnet. We also investigate the limit where the DC $\vec{B}$-field can be considered as spatially constant, which occurs when the sensing element is small when compared to the spatial extent of the electromagnet, and placed centrally within the magnet. The end result is the realisation of new low-mass Broadband Electric Axion Sensing Techniques (BEAST) with improved sensitivity for low-mass detection. [1] ME Tobar, BT McAllister, M Goryachev, Physics of the Dark Universe 26, 100339 (2019).

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