

High frequency axion search cavity using dielectric ring at IBS/CAPP

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In the microwave cavity axion search method proposed by P. Sikivii, the cavity volume, quality factor of the microwave resonant mode, and average electric potential of the mode in the direction of external magnetic field, so called geometrical factor, greatly affect the detection speed. TM₀₁₀ mode of cylindrical cavity has been the only option because it promises the maximum axion searching speed. However, the magnet constrained volume also restricts searchable resonant frequency range where the wavelength is about twice the magnet bore size. Therefore, in order to search a relatively high frequency region, the diameter of the cavity must be reduced unnecessarily, which leads to a serious reduction in the search speed due to the volume downsizing. We suggest solution for this by using the TM₀₃₀ mode to boost the frequency at the same volume, and then devising a way to lock the resulting negative electric field to a high permittivity of dielectric material. I'll show the both simulation and experimental results in conference.

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