

aKWISP: investigating short-distance interactions at sub-micron scales

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The sub-micron range in the field of short distance interactions has yet to be opened to experimental investigation, and may well hold the key to understanding at least part of the dark matter puzzle. The aKWISP (advanced-KWISP) project introduces the novel Double Membrane Interaction Monitor (DMIM), a combined source-sensing device where interaction distances can be as short as 100 nm or even 10 nm, much below the $\approx 10\text{-}30$ micron distance which is the lower limit encountered by current experimental efforts. aKWISP builds on the technology and the results obtained with the KWISP opto-mechanical force sensor now searching at CAST for the direct coupling to matter of solar chameleons. It will reach the ultimate quantum-limited sensitivity by exploiting an array of technologies, including operation at sub-Kelvin temperatures. Recent suggestions point at short-distance interactions studies as intriguing possibilities for the detection of axions and of new physical phenomena.

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