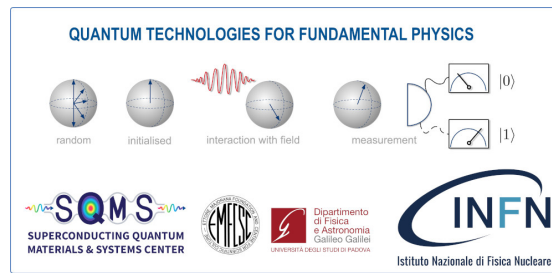


Quantum Technologies for Fundamental Physics



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Search for sub-GeV Dark Matter using superfluid ^3He at ultralow temperatures

Sunday, 3 September 2023 10:15 (20 minutes)

At ultra-low temperatures (ULT) macroscopic quantum states form, such as superfluids, that have unique potential as quantum sensors for rare interactions. The QUEST-DMC QTFP project is deploying this technology at two sites capable of reaching ULT, Royal Holloway (RHUL) and Lancaster University (ULANC), both members of the European Microkelvin Platform, EMP (<https://emplatform.eu/>). QUEST-DMC employs a superfluid helium-3 target for “laboratory cosmology”, studying phase transitions relevant for understanding inflation and searching for light Dark Matter candidates. The Dark Matter search will be based on a small ^3He target constructed as a bolometer. A nanowire sensor will be used to detect the quasi-particles produced when a Dark Matter interaction breaks the fragile ^3He Cooper pairs.

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Session Classification: Superconducting cavities, materials, and quantum technology for detection of weakly-coupled particles