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Low Temperature Hybrid Graphene-Silicon Charge Amplifier

Wednesday 24 July 2024 14:00 (2 hours)

This study presents a novel charge amplifier design top operate cold (77K), tailored for amplifying signals originating from devices such as Silicon Photomultipliers (SiPMs) and High Purity Germanium Detectors (HPGe), commonly employed in fundamental physics experiments. The distinctive feature of the proposed charge amplifier lies in its utilization of a front-end transistor fabricated from graphene, integrated with a silicon-based differential amplifier. The graphene device employed is a Graphene Field-Effect Transistor (GFET), functioning analogously to a conventional Field-Effect Transistor (FET) but with the unique capabilities provided by graphene.
This device harnesses the inherent advantages of an FET, including high input impedance, while capitalizing on graphene-specific benefits such as low noise and high conductivity. These attributes make it particularly well-suited for the targeted application, enhancing overall performance and meeting the stringent requirements of experiments in fundamental physics.

Submitters Country

United States

Author: TURQUETI, Marcos

Co-authors: Dr POON, Alan (LBNL); ANDROMEDA, Phoebe (LBNL)

Presenter: TURQUETI, Marcos

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