
# Fabrication of Neganov-Luke Amplified Cryogenic Light Detectors with Silicon Light Absorbers for Rare Event Search Experiments

**Main author:**

WILLERS Michael

**Co-authors:**

Bruhn Cecilia, Technische Universität München
Defay Xavier, Technische Universität München
Hitzler Ferdinand, Technische Universität München
Lanfranchi Jean-Côme, Technische Universität München
Langenkämper Alexander, Technische Universität München
Mondragon Elizabeth, Technische Universität München
Münster Andrea, Technische Universität München
Oberauer Lothar, Technische Universität München
Potzel Walter, Technische Universität München
Roth Sabine, Technische Universität München, Queen's University Kingston
Schönert Stefan, Technische Universität München
Steiger Hans, Technische Universität München
Wawoczny Stephan, Technische Universität München
Willers Michael, Technische Universität München
Zöller Andreas, Technische Universität München

Ultra-low background experiments employing the phonon-light technique (e.g., the direct dark matter search experiment CRESST-II and the planned EURECA experiment or future experiments searching for neutrino-less double beta decay) rely on the sensitivity of cryogenic light-detectors to achieve an optimal active background suppression. This is especially important for very small amounts of scintillation light, e.g., for the separation between e−/γ and nuclear recoil events in CaWO4 crystals.

Neganov-Luke (NL) amplified cryogenic light-detectors provide a promising method to increase the sensitivity of cryogenic light detectors by drifting photon induced electrons and holes within a semiconductor absorber in an applied electric field (typicall ~100V/cm) and thereby amplifying the phonon signal and increasing the signal-to-noise

ratio. One possible realization of these detectors is based on silicon light absorbers with aluminum electrode strips deposited onto one side of the absorber. The electric drift field is generated by applying a DC-voltage between these electrodes.

We present new results on the fabrication of aluminum electrode strips on silicon light absorbers which enable the application of drift voltages of ~300V across a distance between the electrode of 6mm. These results are highly important for the understanding of the behavior of these devices and optimizing the fabrication with respect to maximizing the signal gain and improvement in signal-to-noise ratio.