

Response of solar cells to heavy ions at energies close to 10 AMeV

Solar cells have been used for several decades to detect fission fragments up to 1 AMeV. In this energy range, they provide an energy resolution of 1-2%, a time resolution of a few ns and better radiation hardness than Si detectors. All these properties, together with their low cost and low sensitivity to light particles, make solar cells an appealing alternative to silicon detectors for the detection of heavy ions.

Since 2018 we have been investigating the possibility to use solar cells for the detection of heavy ions at energies above 1 AMeV. The first exploratory measurements were performed using ^{84}Kr and ^{129}Xe beams at 7-13 AMeV, and ^{238}U at 3.8 MeV at GANIL. These measurements provided us with interesting results in relation to both energy and time resolution, and they evidenced a stable response of the cells when irradiated with beam intensities up to thousands of pps for a few minutes. These results showed the great potential of solar cells to be used in radioactive ion beam facilities for experiments and beam monitoring [1].

In March 2021 we carried out another experiment at GANIL to further study the response of solar cells of different types and dimensions to a ^{84}Kr beam at 5, 10 and 15 AMeV. In this measurement it was possible to successfully study the evolution of the cell response as a function of the beam energy and perform long radiation resistance tests. Moreover, a Si detector was also irradiated under the same conditions, thus enabling for a direct comparison with the solar cells.

In this contribution we will present the experimental procedure and the main results of the conducted measurements.

References

[1] A. Henriques et al., Nucl. Instrum. Methods A 969 (2020) 163941.

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