

THE GSI HEAVY ION MICROBEAM: A TOOL FOR THE INVESTIGATION OF CELLULAR RESPONSE TO HIGH LET RADIATIONS.

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Since the mid 90's, an increasing number of charged particle microbeams have been designed to investigate the cellular response to low doses of radiations.

Since 1987, a single ion hit technique is in operation on the GSI heavy ion microbeam. During the last years, this facility has been upgraded for the irradiation of individual living cells *in vitro*. This set-up presents two main peculiarities compared to the microbeams used up to now for cell irradiation. First, the beam micrometric size is obtained by magnetic focusing and not by a simple collimation. This allows obtaining a smaller beam spot, a better defined LET, and a high irradiation throughput. Then, the GSI microbeam is able to focus ions from carbon to uranium with energies between 1.4 MeV/u to 11.4 MeV/u. The range of accessible LET is thus considerably extended compared to light ions microbeam in operation today.

The design of the GSI microbeam will be described, including the beam control, the online cell localization, the cell dish designed specifically for microbeam irradiation and the cell irradiation procedures. The different tests performed to check the reliability of the system will also be presented. At last, a brief overview of the applications of such a microbeam in radiation biology studies will be exposed.