

## THE MEGAPIE TARGET AND THE RESULTS OF THE RESEARCH ACTIVITIES SUPPORTING THE TARGET DEVELOPMENT

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### Abstract

A liquid metal target based on lead-bismuth eutectic (LBE) of about 1 MW beam power has been designed and is about to be built. It will contain about 82 l of LBE serving as target material and primary heat removal fluid. The 650 kW of thermal heat will be removed by forced convection using an in-line electromagnetic pump with 4 l/sec capacity. The heat will be evacuated from the target through 12 mono-wall cooling pins via an intermediate oil and a water cooling loop. The beam window made of the martensitic steel T91, experiencing a peak current density of about  $50\mu\text{A}/\text{cm}^2$ , will be cooled by a jet of cold LBE of about 1 m/sec extracted at the heat exchanger exit by a second EM pump from the LBE mainstream.

The development is highly innovative and required to investigate a number of issues unknown up to now. For this reason a research program was initiated to improve the understanding of basic phenomena to support the target design. Topics covered nuclear, thermalhydraulics, materials behaviour with respect to radiation damage and corrosion in LBE, liquid metal technology, waste disposal and development of specific components like EM-pumps and flowmeters as well as new instrumentation. The results of this four year program, their application in the target design are presented and first test experiences out of beam are presented.