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R&D activities on the production of ^{211}At at GANIL

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The REPARE ANR project aims at developing a high power targetry to optimize the production of the promising alpha emitter ^{211}At in the $^4\text{He}(^{209}\text{Bi},2n)^{211}\text{At}$ fusion-evaporation reaction. For this, a first task is the precise measurements of several cross-sections to control the production of potential contaminants and to optimize the synthesis of ^{211}At . Several measurements have been performed and will be presented separately at this colloque. A second task is the design of high power target systems. Two options have been investigated : a solid state ^{209}Bi target and a liquid target.

For the first option, the goal is to design, build and use a target station able to sustain 10 kW of beam power. In July 2023, the functionalities of the target station (cooling, current measurements, beam synchronization, ...) will be tested using a ^{20}Ne beam and a dummy target. If the tests are satisfactory, the REPARE irradiation station will be installed in the NFS converter room in September 2023 for a first ^{211}At synthesis run.

For the second option, a milestone is a design study to evaluate the feasibility of a liquid target. Several designs have been evaluated using either pure Bi or a Lead Bismuth Eutectic mixture.

Finally an indirect production route is also under investigation. It consists in the production of ^{211}Rn which beta decays to ^{211}At . This so-called generator technique has several advantages compared to the direct production one.

In this talk the status of these developments will be discussed and presented in a more general perspective.

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