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(19) **United States**(12) **Patent Application Publication**
HOPF et al.(10) **Pub. No.: US 2023/0230793 A1**(43) **Pub. Date: Jul. 20, 2023**(54) **ION BEAM EXTRACTION APPARATUS AND METHOD FOR CREATING AN ION BEAM**(52) **U.S. Cl.**CPC *H01J 27/024* (2013.01); *H05H 3/06* (2013.01); *G21B 1/11* (2013.01)(71) Applicant: **Max-Planck-Gesellschaft zur Foerderung der Wissenschaften e. V., Muenchen (DE)**

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ABSTRACT(72) Inventors: **Christian HOPF**, Garching (DE); **Bernd HEINEMANN**, Garching (DE); **Markus FROESCHLE**, Garching (DE); **Moritz ECKERSKORN**, Garching (DE); **Niek DEN HARDER**, Garching (DE)

An ion beam extraction apparatus (100), being configured for creating an ion beam (1), in particular adapted for a neutral beam injection apparatus of a fusion plasma plant, comprises an ion source device (10) being arranged for creating ions, and a grid device (20) comprising at least two grids (21, 22) being arranged adjacent to the ion source device (10) and having a mutual grid distance d along a beam axis z , wherein the grids (21, 22) are electrically insulated relative to each other, the grids (21, 22) are arranged for applying different electrical potentials for creating an ion extraction and acceleration field (3) along the beam axis z , and the ion source device (10) and the grid device (20) are arranged in an evacuable ion beam space (30) extending along the beam axis z , wherein at least one of the grids is a movable grid (21), which can be shifted along the beam axis z , and the grid device (20) is coupled with a grid drive device (40) having a drive motor (41), which is arranged for moving the movable grid (21) along the beam axis z and setting the grid distance d between the movable grid (21) and another one of the grids (21, 22). Furthermore, applications of the ion beam extraction apparatus and a method of creating an ion beam along a beam axis z are disclosed.

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