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**Compact Multi-Beam Ion Accelerator with High Beam Power for Plasma Heating**[1] QING JI, TIMO BAUER, ARUN PERSAUD, GRANT GIESBRECHT, ZHIHAO QIN, CARLOS VERDOZA, PETER SEIDL, THOMAS SCHENKEL, Lawrence Berkeley National Laboratory, YUETAO HOU, DI NI, SREYAM SINHA, VED GUND, KHURRAM AFRIDI, AMIT LAL, Cornell University — Reducing the size, power needs and cost of accelerators opens new opportunities in mass spectrometry, ion implantation and ultimately plasma heating for fusion. Our technology is based on wafer-based components (silicon or circuit boards) where beam transport is in the direction of the surface normal to the wafer. This allows stacking of wafers to increase beam energy while limiting the peak voltage to several kilovolts. The wafer-based implementation allows us to operate multiple ions beams on a single wafer in parallel for much increased current densities per wafer in a multi-beamlet arrangement compared to a single beam with one large aperture. We will report the experimental results of scaling up to mA of beam current using an array of 112 beamlets, and an average energy gain of 8 keV per acceleration gap. We will also discuss the effort of building a compact accelerator to achieve beyond 100's keV beam energy.

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