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**DE LANGE et al.**(10) **Pub. No.: US 2022/0407482 A1**(43) **Pub. Date: Dec. 22, 2022**(54) **PARAMETRIC AMPLIFIER AND USES  
THEREOF****H01L 39/02** (2006.01)**H01L 27/18** (2006.01)(71) Applicant: **Microsoft Technology Licensing, LLC**,  
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**39/025** (2013.01); **H01L 27/18** (2013.01)(72) Inventors: **Gijsbertus DE LANGE**, Schiphol  
(NL); **Wolfgang PFAFF**, Delft (NL)

(57)

**ABSTRACT**(73) Assignee: **Microsoft Technology Licensing, LLC**,  
Redmond, WA (US)

A parametric amplifier for amplifying an input signal includes a resonator comprising a Josephson junction. The Josephson junction comprises a first superconductor component, a second superconductor component and a semiconductor component. The semiconductor component is configured to enable coupling of the first and second superconductor components. The parametric amplifier further comprises a gate electrode configured to apply an electrostatic field to the semiconductor component of the Josephson junction for tuning the parametric amplifier. Such parametric amplifiers are useful for amplifying signals in the microwave frequency range. Tuning the junction by electrostatic gating may allow for improved scalability compared to tuning using magnetic flux. Also provided are the use of the parametric amplifier to amplify a signal; and a method of amplifying a signal.

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