Josephson Parametric Dimer based on quarter wavelength microstrip Josephson junction array resonators.

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Superconducting qubits have become a promising and rapidly growing research area over two last decades. But there are certain challenges of working with such a delicate system. One of them is the qubit state readout. Since a very small signal (of an order of 1 photon) is used for the readout, its detection is challenging and it requires low-noise cryogenic amplifiers working in 3-12 GHz frequency range.

Josephson parametric amplifiers are one of the most studied and developed candidates. Currently, several JPA designs offer low noise performance, instantaneous bandwidth from tens of MHz to several GHz, and they are becoming an integral part of cQED setups. Nowadays, the Josephson Parametric Dimer (JPD) proposed by C.Eichler in 2014 is one of the most user-friendly JPAs, because it offers non-degenerate operation, high saturation power, and large gain-bandwidth product.

I will present a similar JPD design based on quarter wavelength microstrip resonators employing long arrays of several hundred SQUIDS. I will discuss the mode structure of the device, its performance and operation.