

## **FIU Team's Groundbreaking Research Redefines the Boundaries of Quantum Device Performance**

The ECE department at Florida International University is delighted to share a significant breakthrough in the field of quantum technology. A joint research publication, entitled "*Fano-qubits for quantum devices with enhanced isolation and bandwidth*," [\[link\]](#) has been selected as the Editor's Pick in Applied Physics Letters, underscoring its cutting-edge nature and potential for transformative impact.

Led by Dr. Alex Krasnok and featuring the impressive talent of student Deepanshu Trivedi, along with Dr. Leonid Belostotski and Dr. Arjuna Madanayake, the team addresses an important challenge – the requirement for efficient quantum isolators.

Traditionally, solutions for these problems were fraught with shortcomings, such as limited bandwidth, low tunability, high losses, and lack of compatibility with planar technologies like circuit QED. However, the team's innovative approach leverages the inherent nonlinearity of qubits and spatial symmetry disruption to transform Lorentz-type qubits into Fano-type qubits.

What does this mean in everyday terms? These newly minted Fano-type qubits display an asymmetric spectral response, leading to a remarkable enhancement in isolation - up to 40 dB - and a doubling of spectral bandwidth - up to 200 MHz. This progress, based on realistic circuit parameters, existing experimental results, and comprehensive quantum simulations, opens up exciting possibilities for more efficient quantum devices.

This leap forward heralds a new era in the development of compact, high-performance, planar-compatible non-reciprocal quantum devices. Such advances promise to revolutionize quantum computing, communication, and sensing, by providing superior noise protection and a broader bandwidth. Our ECE team at FIU is excited to continue contributing to the rapid evolution of this field.