



## Seminar/Talk

# New insights into Quantum Spin Hall-based Josephson junctions

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Josephson junctions based on the Quantum Spin Hall Effect (QSHE) [1,2] offer a promising playground to manipulate the helical edge states in view of spintronics and superconducting spintronics applications. Despite an intense research effort, a theoretical model for some experimentally relevant setups is still missing. In this context, I will consider a QSH-based Josephson junction with a constriction between the edge channels [3]. In this system, the transport of Cooper pairs is significantly affected by single-electron effects, and peculiar signatures emerge. In particular, I will show that the relevant flux quantum in the interference pattern doubles [4], and an anomalous Josephson effect arises in the presence of reconstructed edges [5,6]. Lastly, I will describe how the Cooper pair injection and the interference oscillations are modified if the edge states are broadly extended across the junction [7]. [1] S. Hart et al., Nat. Phys. 10, 638-643 (2014). [2] V. S. Pribiag et al., Nat. Nanotechnol. 10(7), 593-597 (2015). [3] J. Strunz et al., Nat. Phys. 16, 8388 (2020). [4] L. Vigliotti et al., New J. Phys. 24(5), 053017 (2022). [5] J. Wang et al., Phys. Rev. Lett. 118, 046801 (2017). [6] L. Vigliotti et al., Nanomaterials 13(9), 1497 (2023). [7] L. Vigliotti et al., Nanomaterials 13(3), 569 (2023). OR join via Join Zoom Meeting: <https://istaustria.zoom.us/j/68357805695?pwd=aHdHZTEvMHdIVzJwaFhyTXFuOXl0dz09> Meeting ID: 683 5780 5695 Passcode: 932596

**Thursday, June 15, 2023 01:00pm - 02:00pm**

Sunstone Bldg / Ground floor / Big Seminar Room B / 63 seats (I23.EG.102)



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