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Stellar Clusters as the Nurseries of Black Holes

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Over the last years, the continuous discovery of gravitational waves from merging black holes has resulted in a quantum leap of our understanding of the most enigmatic objects in the universe. Still, many open questions remain. In my talk, I will highlight the importance of star clusters in our quest of performing a cosmic census of black holes. Being the natural habitat of massive stars, star clusters are expected to form numerous black holes as their stellar populations age. However, the fate of a clusters' black hold population is still largely unknown. While natal kicks or gravitational encounters are likely to eject a substantial number of black holes from their host clusters, others are expected to merge and potentially grow to intermediate-mass black holes with masses above 100x solar. I will describe how integral-field spectroscopy has opened a new window to uncover the hidden black hole populations of star clusters. In particular, I will show results from an ongoing MUSE survey of massive star clusters, which has already led to the detection of several black holes in the Galactic globular cluster NGC3201. Such observations, in combination with sophisticated dynamical models, allow us to constrain the numbers and masses of black holes residing in star clusters of all ages.