



Contribution ID : 16

Type : **Poster**

The Final Mass and Early Growth of the Intermediate-Mass Black Hole in Omega Centauri

Wednesday, 28 October 2026 14:16 (1)

Intermediate-mass black holes (IMBHs), with masses between 10^2 and $10^5 M_\odot$, may represent a missing link between stellar and supermassive black holes, yet few compelling candidates are known. In the Milky Way globular cluster Omega Centauri (ω Cen), Häberle et al. (2024) recently identified several stars near the cluster centre with projected velocities exceeding the escape velocity, implying the presence of a central compact object with a mass $M_\bullet \approx 8 \times 10^3 M_\odot$ and making it a strong IMBH candidate. We follow up on previous work in which we jointly modelled the orbits of the five most reliably measured fast-moving stars. Simultaneously fitting Keplerian orbits to their sky positions, proper motions, and line-of-sight velocities yielded an IMBH mass of $M_\bullet = (6.4_{-0.7}^{+0.8}) \times 10^4 M_\odot$. We predict that sky-plane accelerations for the three innermost stars will become detectable ($> 3\sigma$) by 2030, which can confirm an IMBH and constrain its properties with greater precision. Our inferred mass agrees with Monte Carlo N -body simulations of ω Cen (González Prieto et al. 2025), which grow IMBHs to around $\sim 50,000 M_\odot$ over 12 Gyr from initial black hole seeds of $500 - 5000 M_\odot$. However, the formation mechanisms for such massive seeds early in the cluster's evolution are an open question. Using rapid cluster-evolution models motivated by the initial conditions of ω Cen, we identify viable seed-formation pathways through runaway stellar collisions and hierarchical black hole mergers.

Did you give a contributed talk at CASCA 2026?

No

If you are selected for a poster, would you be interested in giving a short flash talk on your work?

Yes

What is your career level?

Undergraduate

Which keyword describes the area of focus of this talk?

Black holes

Primary author(s) : HAYDUK, Mackenzie (Saint Mary's University); Dr HÉNAULT-BRUNET, Vincent (Saint Mary's University)

Presenter(s) : HAYDUK, Mackenzie (Saint Mary's University)

Session Classification : Black holes & Instrumentation