



Contribution ID : 23

Type : **Contributed talk**

Early Black-Hole Growth Constraints from JWST

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Aims. Massive black holes in the early Universe had limited time to assemble. We identify which JWST black-hole candidates place the strongest constraints on early growth models and assess how these constraints depend on mass estimates and growth assumptions. **Methods.** We compile 350 published measurements at $z \geq 4$ and analyse a primary sample of 220 objects with broad Balmer-line masses. An expanded sample adds 13 tentative or conditional Balmer-line candidates and GN-z11, whose mass is inferred from ultraviolet lines. We propagate reported mass uncertainties and test mass-scale shifts and alternative growth assumptions. **Results.** For $100 M_{\odot}$ seeds formed at $z = 30$, radiative efficiency $\epsilon = 0.1$, and no merger boost, 8 of the 220 objects require a lifetime-average Eddington ratio $\bar{f}_{\text{Edd,req}} > 1$. Five exceed unity in at least 95% of Monte Carlo draws using the reported mass uncertainties. For UNCOVER-20466, COSMOS3D-13852, and RUBIES-EGS-55604, at least 95% of draws still require an average Eddington ratio above 1 after reducing each mass by 0.5 dex (a factor of approximately 3.2). Delaying seeding to $z = 20$ gives GN-z11 the highest required average Eddington ratio. At $\epsilon = 0.05719$, the ideal thin-disc efficiency for a non-spinning black hole, all 234 central mass estimates are reachable from $100 M_{\odot}$ seeds formed at $z = 30$ without lifetime-average accretion above the Eddington limit.

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

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Session Classification : Black holes & Instrumentation