The origin and formation of supermassive black holes residing within active galaxies' nuclei is an open question. One possibility is that they evolved from seeds such as the remnants of supermassive stars, weighing $\sim 10,000$ solar mass, through direct collapse. However, the very existence of these supermassive stars is hypothetical.

Writing in *Nature*, John H. Wise and colleagues used cosmological hydrodynamics simulations to

investigate the formation of early stars and found that the right conditions for the formation of supermassive stars arise in metal-free primordial gas haloes. These haloes (pictured) in turn seem to emerge naturally and go through periods of rapid growth during which supermassive stars, and from them direct collapse black holes, are likely to form. The authors suggest these processes indicate that black hole seeds may be more common in

the over-dense regions of the early Universe than previously suspected.

Wise et al. predict that the direct collapse black holes may give birth to a population of faint quasars — a possibility that could be confirmed by the upcoming James Webb Space Telescope.

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ORIGINAL ARTICLE Wise, J. H. et al. Formation of massive black holes in rapidly growing pre-galactic gas clouds. *Nature* <https://doi.org/10.1038/s41586-019-0873-4> (2019)