

# Seminar

von

Dr. Daniel Whalen

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## **The First Quasars in the Universe**

Massive black holes ranging from several million to several billion solar masses are found at the centers of most massive galaxies today. But over 120 quasars have now been discovered at  $z > 6$ , less than a Gyr after the Big Bang, including ULAS J1120+0641, a 2 billion solar mass BH at  $z = 7.1$  and SDSS J0100+2802, a twelve billion solar mass BH at  $z = 6.3$ . How these quasars formed and reached such large masses by such early epochs is still unclear, but they may have been born in the collapse of supermassive stars in hot, dead protogalaxies at  $z \sim 20$  and been fueled thereafter by cold accretion flows, like those thought to drive rapid star formation in some galaxies at later times. I will review our work on the formation of supermassive Pop III stars at  $z \sim 20$ , their subsequent collapse to massive SMBH seeds, and their growth to over a billion solar masses by  $z \sim 7$ . I will conclude with new radiation hydrodynamical simulations of SMBH growth in cosmological environments with the Enzo code that reproduce all observed properties of J1120 at  $z = 7.1$ .

**Montag, 06. November 2017, um 15:00 Uhr im HS**

des Institutes für Astrophysik, Türkenschanzstraße 17, 1180 Wien