Z230a Beyond the optical: Tracing supermassive black hole growth across cosmic time

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Wide-area and high sensitivity surveys, unique features of optical-band observations as of now, are undergoing a transformative phase from the 2020s to the 2030s, expanding their wavelength range to include radio (VLASS+ngVLA) and infrared (Euclid+Roman). We summarize the upcoming wide-field multi-wavelength surveys, which will open new avenues for observing supermassive black holes (SMBHs). We emphasize the essential role of optical and infrared observations in revealing the physical properties of SMBHs. Specifically, we introduce the AGN surveys that expand our domain reaching to $z \leq 10$, enabling exploration of early black hole formation beyond cosmic reionization. By combining multi-wavelength observations, we aim to uncover dust and gas obscured SMBHs in the distant universe. Through the combination of UNIONS, Rubin, PFS, Euclid, and Roman, and other multiwavelength datasets, we will constrain key physical parameters of SMBHs such as redshift, BH mass, and gas accretion rate, and will enable us to elucidate the birth and growth history of SMBHs across the universe up to $z \sim 10$.