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<b>Title</b>	AGN life cycles, SMBH Masses, and Galactic Winds: Advancing our Understanding of SMBH-Galaxy Co-evolution with the ngVLA
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of the gas as it flows in from the outer disk, assembles into clouds, and experiences feedback due to star formation or accretion into central super-massive black holes. These investigations will crucially complement studies of the star formation and stellar mass histories with the Large UV/Optical/Infrared Surveyor and the Origins Space Telescope, providing the means to obtain a comprehensive picture of galaxy evolution through cosmic times.

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### **361.22 - AGN life cycles, SMBH Masses, and Galactic Winds: Advancing our Understanding of SMBH-Galaxy Co-evolution with the ngVLA(Kristina Nyland)**

A key missing element in our understanding of cosmic assembly is the nature of energetic feedback from supermassive black holes (SMBHs) and the impact of active galactic nuclei (AGN) on galaxy evolution. The next-generation Very Large Array (ngVLA), which will provide a ten-fold improvement in sensitivity and angular resolution compared to the current VLA, will serve as a transformational new tool in our understanding of AGN feedback as a function of redshift and environment. By combining broadband continuum data with spectral line measurements of the cold gas contents and kinematics of galaxies, the ngVLA will probe the evolution and life cycles of the radio-quiet and radio-loud AGN populations in unprecedented detail, quantify the energetic impact of AGN feedback on the star-forming reservoirs of gas-rich galaxies, and place constraints on SMBH formation and growth. Here, we present an overview of how the current reference design of the ngVLA will facilitate these advancements in our understanding of SMBH-galaxy co-evolution, with an emphasis on prospects for continuum surveys, the detection of molecular outflows out to high redshifts, and precision CO-dynamics-based SMBH mass measurements. We also discuss the importance of the next-generation Low-band Observatory (ngLOBO), a commensal low-frequency enhancement to the main ngVLA design, to maximize the utility of the ngVLA for AGN science.

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### **361.23 -**

#### **Evidence of Complex B-field Structures in the ICM surrounding Cygnus A(Makhuduga Lerato Sebokolodi)**

A new high sensitivity polarization study of Cygnus A using 2-18 GHz JVLA data shows significant depolarization below 6 GHz with 0.75" (750 pc) resolution, as well as complicated polarization structures. The newly measured rotation measures (RM) are consistent with those obtained from previous studies [1, 2]; with RMs ranging from -3000 to +1300 rad/m/m in the western lobe and -5500 to +3000 rad/m/m in the eastern lobe. Our preliminary analysis indicates multi-scale B-fields with scales > 120 kpc and < 300 pc in the vicinity of Cygnus A. There is also a strong evidence that these large RMs originate from the large-scale uniform B-fields in the ambient ICM -- in agreement with [1, 2]. We show that the observed depolarizations and polarization structures at our optimum resolution (750 pc) may result from small-scale fluctuations across the beam. However, it still remains a mystery whether all these complex B-fields are in the ambient ICM, or whether some are in compressed gas local to the source. But we are confident that internal effects due to a mixing of thermal and synchrotron gas are minor. Ideal observations for addressing this problem would be those that can achieve high resolutions < 0.3" while preserving the spectral resolution (2-18 GHz). Achieving this requires an instrument with a minimum baseline that is 3x longer than the current JVLA longest baseline. Such baseline lengths are typical of the ngVLA (180-300 km) and the SKA (200 km). We present the above ongoing analysis, and the different techniques utilised including RM Synthesis [3] and direct fitting to Stokes Q and U data. References[1] Perley R.A., & Carilli C.L. 1996, Cygnus A -- Study of a Radio Galaxy, 168[2] Dreher et.al., 1987, APJ, 316, 611[3] Brentjens M.A., & de Bruyn., A.G. 2005, A&A, 441, 1217

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### **361.24 - ngVLA searches for pulsars at the Galactic center(Paul Demorest)**

Detection of one or more pulsars in orbit about our galaxy's central supermassive black hole (Sgr A\*) is a long-standing, yet still elusive, goal in physics and astrophysics. Timing observations of a pulsar as it orbits Sgr A\* would provide high-precision measurements of the black hole properties (mass, spin), and new tests of fundamental predictions of general relativity such as the no-hair theorem and cosmic censorship conjecture. Characterizing a population of pulsars at the Galactic center would also give new astrophysical insight into the mass distribution, interstellar medium (ISM) properties, magnetic field, and star formation history of this complex and interesting region. The presence of young massive stars in the region leads to predictions of large numbers of neutron stars. However despite many observational attempts, only a handful of pulsars have been detected in the central ~degree, and none