Direct observation of frozen gallium gas on wurtzite gallium nitride (0001) using low-temperature scanning tunneling microscopy KHAN ALAM, ANDREW FOLEY, WENZHI LIN, JOSEPH CORBETT, YINGQIAO MA, JEONGIHM PAK, ARTHUR SMITH, Nanoscale and Quantum Phenomena Institute, Ohio University, Athens, OH — Gallium nitride layers are ordinarily grown under gallium-rich growth conditions by molecular beam epitaxy (MBE) to obtain the highest material quality. In 1997, Smith et al. reported the family of reconstructions existing on the growth surface at room temperature, the highest-order being the c(6x12).[1] Additional gallium deposition does not lead to new reconstructions. Instead, excess gallium atoms are presumed to exist in a 2-dimensional gas state. Using a custom-built MBE/low-temperature (4.2 K) STM system, we have imaged this gallium gas for the first time by freezing out the motion. The frozen-out gallium atoms are visualized as asymmetric ‘L-shaped’ features, with left-handed and right-handed L’s scattered randomly across the surface. Interestingly, on any given atomic terrace we observe a 4x greater probability of left-handed versus right-handed L’s (or vice versa), which inverts across bilayer-height steps. The cause of this asymmetry is explored by zooming in with atomic resolution, revealing two inequivalent adsorption sites. [1] A. R. Smith et al. Phys. Rev. Lett., 79, 3934 (1997).