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Hexatic and Microemulsion Phases in the 2d Quantum Plasma BRYAN CLARK, Department of Physics, University of Illinois at Urbana Champaign, MICHELE CASULA, Centre de Physique Théorique, Ecole Polytechnique, CNRS, 91128 Palaiseau, France, DAVID CEPERLEY, Department of Physics, University of Illinois at Urbana Champaign — It has been long known that the twodimensional one component plasma supports both a Wigner-crystal and liquid phase. Classically [1,2], it is known that a hexatic phase exists but it is not known how this hexatic phase extends into the quantum regime. Moreover, at low temperature, phenomenological arguments [3] from Jamei, et. al. suggest the existence of microemulsion phases including stripes and bubbles. We use diffusion and path integral Monte Carlo to map out this phase diagram. We are able to extend the hexatic phase into the quantum regime as well as quantify the nature of the defects and exponents in the long range quantum system. We also specify the the nature, extent and existence (or lack thereof) of the expected low-T microemulsion phases. [1] Muto, S. & Aoki, H. Crystallization of a classical two-dimensional electron system: Positional and orientational orders. Phys. Rev. B 59, 14911(1999).

[2] He, W.J. et al. Phase transition in a classical two-dimensional electron system. Phys. Rev. B 68, 195104(2003).

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