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Monte Carlo study of a $U(1) \times U(1)$ system with π -statistical interaction SCOTT GERAEDTS, OLEXEI MOTRUNICH, California Institute of Technology — We study a $U(1) \times U(1)$ system with two species of loops with mutual π -statistics in (2+1) dimensions. We are able to reformulate the model in a way that can be studied by Monte Carlo and we determine the phase diagram. In addition to a phase with no loops, we find two phases with only one species of loop proliferated. The model has a self-dual line, a segment of which separates these two phases. Everywhere on the segment, we find the transition to be first-order, signifying that the two loop systems behave as immiscible fluids when they are both trying to condense. Moving further along the self-dual line, we find a phase where both loops proliferate, but they are only of even strength, and therefore avoid the statistical interactions. We study another model which does not have this phase, and also find first-order behavior on the self-dual segment.

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