Effect of synthetic magnetic fields on quasi-2D gases of bosons
MATTHEW BEELER, KARINA JIMENEZ-GARCIA, LINDSAY LEBLANC, ABI-
GAIL PERRY, ROSS WILLIAMS, IAN SPIELMAN, Joint Quantum Institute, 
NIST and University of Maryland — An ultra-cold gas of atoms can realize many 
different model Hamiltonians. When tightly confined in one spatial dimension, the 
gas can become effectively 2D. At a critical temperature, a quasi-2D Bose gas un-
dergoes a Berezinskii-Kosterlitz-Thouless (BKT) phase transition to a superfluid as 
thermally excited pairs of vortices with opposite circulation bind together [1]. In 
general, a superfluid responds to the presence of a synthetic magnetic field with the 
formation of vortices [2], expected to all have the same circulation direction. These 
vortices induced by the synthetic magnetic field should have an effect on the micro-
scopic mechanism behind the BKT phase transition, which may alter the properties 
of the quasi-2D Bose gas.