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2D Surface Trap for Quantum Simulation¹ JONATHON GILLEN, WASEEM BAKR, AMY PENG, SIMON FÖLLING, MARKUS GREINER, Harvard/MIT Center for Ultracold Atoms and Department of Physics Harvard University — We present a novel optical trapping scheme for low dimensional quantum gases. Using a combination of evanescent waves, standing waves, and magnetic potentials we create a 2D Bose-Einstein condensate at a distance of only a few microns away from a glass surface. The trapping potentials near the surface are smooth and allow for a highly anisotropic confinement with an aspect ratio of 300:1:1 as well as long lifetimes of the 2D quantum gas. We are able to directly detect phase fluctuations and vortices. The setup is especially suitable for many body quantum simulations and applications such as high precision measurements close to surfaces.

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