A Bose-Einstein condensate responds to rotation by forming quantized vortices. The quantum fluctuations of these vortices are greatly enhanced by slicing the Bose-Einstein condensate into a stack of two-dimensional pancake-condensates by means of an optical lattice. A single vortex line in this setup has bosonic fluctuations and is equivalent to a bosonic string. By trapping fermionic atoms in the vortex cores, a superstring can be realized. Multiple vortex lines order in a Abrikosov lattice. Vortex fluctuations melt the vortex crystal after which highly correlated quantum liquids are formed. This transition is studied as a function of rotation frequency, lattice strength and temperature.