Quantum magnets are natural realizations of gases of interacting bosons, specifically magnons, whose relevant parameters such as dimensionality, lattice geometry, amount of disorder, nature of the interactions and particle concentration can vary widely between different compounds. The particle concentration can be easily tuned by applying an external magnetic field, which plays the role of a chemical potential. This rich spectrum of realizations offers a unique possibility for studying the different physical behaviors that emerge in interacting Bose gases from the interplay between their relevant parameters. I will discuss bosonic phases that can emerge in quantum magnets, of which Bose-Einstein condensation is the most basic ground state. The possibility of using controlled theoretical approaches has triggered the discovery of unusual effects induced by frustration, dimensionality or disorder [1]. $SrCu_2(BO_3)_2$, a spin-1/2 Heisenberg antiferromagnet in the archetypical Shastry-Sutherland lattice, exhibits a rich spectrum of magnetization plateaus and stripe-like magnetic textures in applied fields. We observed new magnetic textures, via optical FBG magnetostriction measurements conducted in magnetic fields up to 100 Tesla, at 73.6 T and at 82 T [2] which we attribute, using a density matrix renormalization group approach, to a 2/5 plateau and to the long-predicted 1/2-saturation plateau respectively. Electronic density functional theory (DFT) is used to quantify the dependence of the Cu-O-Cu bond angle on the magnetic state of Cu-dimers, and the effects of such dependence on the crystal lattice. Work at the NHMFL was supported by the National Science Foundation, the US Department of Energy Office of Basic Energy Science through the project "Science at 100 Tesla," and the State of Florida.

[1] V. Zapf. M. Jaime, and C.D. Batista, Rev. Mod. Phys. (2014), in the press

[2] M. Jaime, et al., Proc. Natl. Acad. Sci. 109, 12407 (2012).