Supersymmetry on Curved Spaces

This talk has two parts. In part I, Bei Jia will discuss $N=1$ nonlinear sigma models coupled to $N=1$ vector multiplets on four-manifolds, via a decoupling gravity procedure from 4d $N=1$ supergravity coupled to gauge fields. One of the results is that in one class of these models, the Fayet-Iliopoulos parameters will need to vanish. Furthermore, he will discuss the appearance of affine bundles in these theories, which is the rigid supersymmetric analog of the Bagger-Witten line bundle after decoupling from gravity.

In part II, he will discuss general $N=(2,2)$ nonlinear sigma models of both chiral multiplets and twisted chiral multiplets on $S^2$. In contrast to the four-dimensional cases, there is no further constraint needed on the target space, except the appearance of a holomorphic Killing vector field, representing the vector like $U(1)_R$ part of the $N=(2,2)$ supersymmetry algebra on $S^2$. He will also discuss the observation that those curvature coupling terms in our Lagrangian lead to the absence of the usual symmetry between chiral multiplets and twisted chiral multiplets on $R^2$, as well as the usual topological twists.