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Co-Higgs bundles and holomorphic Poisson structures

Co-Higgs bundles on a complex manifold M are pairs (E, ϕ), where E is a holomorphic vector bundle on M and $\phi \in H^0(M, \mathrm{End(E)} \otimes \mathrm{TM})$ is a Higgs field satisfying the integrability condition $\phi \wedge \phi = 0$. Such objects are equivalent to generalized holomorphic bundles on complex manifolds. Moreover, the Higgs field induces a distinguished class of holomorphic Poisson structures on the projectivization $\mathbb{P}(E)$, yielding numerous examples of compact holomorphic Poisson manifolds. This correspondence was first observed by A. Polishchuk, while moduli spaces of stable rank-2 co-Higgs bundles were constructed by S. Rayan on $\mathbb{P}^1$ and $\mathbb{P}^2$. In this talk, we examine the interplay between the algebraic properties of Higgs fields and the geometry of the associated Poisson manifolds, and we present new examples on curves and surfaces.