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Collective Heavy Top Dynamics.

We construct a Poisson map $\mathbf{M}$ that relates the heavy top dynamics with a canonical Hamiltonian system. It is well known that the heavy top dynamics can be described as a Hamiltonian system using the $(-)$-Lie–Poisson bracket on the dual $\mathfrak{se}(3)^*$ of the Lie algebra of the special Euclidean group $\mathsf{SE}(3)$. Our map $\mathbf{M}: T^*\mathbb{C}^2 \to \mathfrak{se}(3)^*$ is Poisson with respect to the canonical Poisson bracket on $T^*\mathbb{C}^2 \cong T^*\mathbb{R}^4$ and the $(-)$-Lie–Poisson bracket on $\mathfrak{se}(3)^*$. The essential part of this map is the momentum map associated with the cotangent lift of the natural right action of the semidirect product Lie group $\mathsf{SU}(2) \ltimes \mathbb{C}^2$ on $\mathbb{C}^2$. This Poisson map gives rise to a canonical Hamiltonian system on $T^*\mathbb{C}^2$ whose solutions are mapped by $\mathbf{M}$ to solutions of the heavy top equations. We show that the Casimirs of the heavy top dynamics and the additional conserved quantity of the Lagrange top correspond to the Noether conserved quantities associated with certain symmetries of the canonical Hamiltonian system. (Received September 04, 2019)