

Action-angle variables for geodesic motions in toric Sasaki–Einstein spaces

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We describe the construction of Stäckel–Killing tensors on toric Sasaki–Einstein manifolds using their geometrical properties. We take advantage of the fact that the metric cones of these spaces are Calabi–Yau manifolds. This general procedure for toric Sasaki–Einstein manifolds is exemplified in the case of the 5-dimensional space $T^{1,1}$. We construct the constants of motion and action-angle variables for geodesics and prove the complete integrability. Finally we investigate how these integrable systems react to small perturbations. Analyzing the workings of the KAM theorem we find evidence of lost of integrability and chaotic behaviour related to the presence of resonant angular frequencies.