Orbital dynamics of three-dimensional bars:

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Abstract. We study the conditions that favour boxiness of isodensities in the face-on views of orbital 3D models for barred galaxies. Using orbital weighted profiles we show that boxiness is in general a composite effect that appears when one considers stable orbits belonging to several families of periodic orbits. 3D orbits that are introduced due to vertical instabilities, play a crucial role in the face-on profiles and enhance their rectangularity. This happens because at the 4:1 radial resonance region we have several orbits with boxy face-on projections, instead of few rectangular-like x1 orbits, which, in a fair fraction of the models studied so far, are unstable at this region. Massive bars are characterized by rectangular-like orbits. However, we find that it is the pattern speed that affects most the elongation of the boxy feature, in the sense that fast bars are more elongated than slow ones. Boxiness in intermediate distances between the center of the model and the end of the bar can be attributed to x1v1 orbits, or to a combination of families related to the radial 3:1 resonance.