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Interactive comment on "Highly Stable Magic Angle Spinning Spherical Rotors Lacking Turbine Grooves" *by* Thomas M. Osborn Popp et al.

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I have two concerns regarding this draft.

1. Figure 4A shows that as the inner radius (r) in a sphere increases, the moment of inertia along Iz and Ix(or Iy) become unequal, with inertia along Iz being larger than Ix. The authors have used this fact to support the spinning-stability of sphere without groves.

The moment of inertia of a sphere is proportional to the radius of sphere (R). Therefore, the absolute difference between the inertia in two directions (z and x) is also proportional to R.

In the case presented, the sphere is large 9.5mm (with the maximum speed of ∼4-5

kHz), and therefore it has a preferred axis of rotation. But as one goes for smaller sphere to achieve faster spinning (which is a major goal here), the absolute difference between Iz and Ix will be smaller and smaller. And in such scenario, the spinning along any particular axis will not be stable.

2. The authors have compared two cases, a sphere vs. a cylinder in figure 4. Sphere (hollow one) has preference to spin along "z" and a cylinder along "x". Using this simple comparison, authors have shown why a sphere is better than cylinder for stability.

In reality, the sample cup should be viewed as a combination of coaxial: (i). Spherical ring, (ii) a hollow cylinder (in which sample will be filled), (iii) a solid cylinder (basically the sample filled in the cylinder) and (iv) curved cap.

Different components (i, ii, iii and iv) will have different inertia. These are known or at least easy to calculate. Since moments of inertia are additive, it is possible to do a a more realistic calculations, taking into consideration moments of inertia of all these components.

Minor concern: Authors have used same notations to represent the dimensions of the two objects. It is better to use distinguished symbols to , e.g., r_s, R_s, r_c and R_c.

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