New Figures

In our calculations regarding the trajectory of the system in the angular-momentum space, we have two different cases of states:

- System rotates around axis x_1
- System rotates around axis x_3

The first case is valid when the energy E of a spin-state I (from one of the four TSD bands) is *smaller* than E_{trans}. Furthermore, if the energy if that state is *larger* than E_{trans}, then the system belongs to the second case, i.e. the nucleus rotates around x_3. **Note:** We denoted with E_{trans} the energy at which the two (symmetrical) trajectories of the system intersect.

The current 3-dimensional representation of the trajectories are a great way of depicting how the rigid (even) rotor might move when coupled to a (odd) valence nucleon.

Drawback: in the 3D case representation it is hard to view multiple trajectories of the same spin state I but at different energies, or even different states I with different energies. For example TSD1 has 21 states; therefore, a solution would be a grid plot with 21 figures, one for each state (since superimposing two different 3-dimensional figures is not doable). But by doing this, the difference in the trajectories might not be easy to spot when looking at 21 different shapes.

Solution: Plot a 2-dimensional representation of the trajectory of the system for a given spin and energy. The 2d representation will be in fact **the projection** of the ellipse generated by intersecting the ellipsoid and the sphere. In this way, it is possible to plot on the same figure, 21 contour lines. **Note**: since we have two cases of rotation, we must make two such figures, i.e.:

- projecting the ellipse onto the x_3Ox_2 plane, when the energy is less than E_{trans}
- projecting the ellipse onto the x_1Ox_2 plane, when the energy is larger than E_{trans}

The calculations will be done in Mathematica. Below is an example for the projections of a simple ellipsoid (generated by the most general formula). When adopting the actual expression of our energy function, and the numerical values of the spin and energy, similar contours need to be obtained. The ellipsoid used for *the testing phase*, was a generic one:

$$a_1x^2 + a_2y^2 + cz^2 = c_0 \tag{1}$$

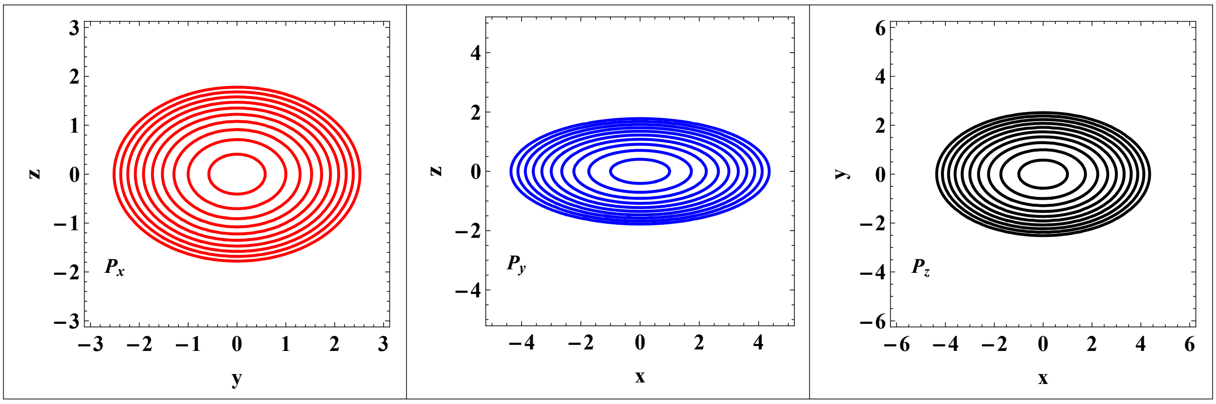

Figure 1: Projections of a general ellipsoid onto the 3 planes. Each contour line is in fact a different value of the constant term c_0 given in formula 1.