

## 26.3: Throwing a Football...

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If you throw a football and manage to give it only spin about the long axis, it will stay pointing that way (apart from drag effects, which will tend to line up spin direction with velocity). If when you throw it you also add some angular velocity along a shorter axis, it will precess (wobble). Given the angle, the ratio of precession to spin is fixed.

If you take a ball that is already spinning fast about its long axis, have the two ends of the long axis (its points) in your palms, then, as you throw it, give it a quick twist by moving one hand downwards and the other up as you throw, to give it significant angular velocity about a short axis, at the same time keeping the fast spin about the long axis, once the ball leaves your hands, the angle between the spin and the total angular momentum, the angle of wobble, is completely determined by the ratio of the two angular velocities.

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