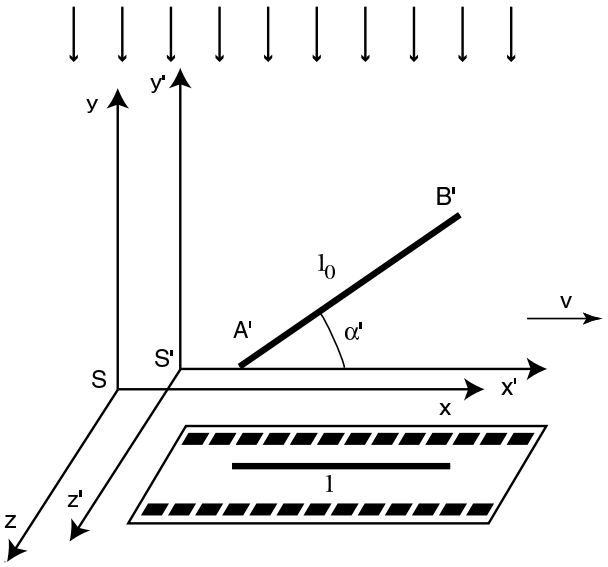
Physics 820 homework due Mon Nov 18

Reading: Chapters 7, 8.1

Problems:

1. The coordinate axes of two inertial frames S and S' are aligned, as shown. The frame S' moves at a speed v in the $+x$ direction relative to S. A rod of proper length ℓ_0 is at rest in the $x'y'$ plane in S', at an angle α' relative to the x' axis. As the rod passes by the photographic film at rest in the xz plane in S, a short flash of light is emitted in S, with rays perpendicular to the film, as marked by the short arrows in the figure. (a) What track length ℓ will the rod leave on the film? Can ℓ be equal to or longer than ℓ_0? (b) If the rod were at rest in S, at what angle β would it need to be inclined, to the x axis, to leave such a track? (c) At what actual angle α is the rod inclined relative to the x axis in S? (d) For what angle α', will only the tip of the rod get recorded on the film?



2. Goldstein, Problem 7-19.

3. Goldstein, Problem 7-21.

4. Goldstein, Problem 7-23.

5. Goldstein, Problem 7-25.