Relativistic Physics for Teachers SS 2006

Problems 3 27.4.2006

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1. **Red-shift of stars**
   The H_α line of a star (wave length at rest: $\lambda_0 = 6563$A) seems to be shifted by $\Delta\lambda = 30$A into the red when observed from earth. How fast does the star move and in which direction?

2. **Transformation of angles**
   In system S a photon is emitted at $t = 0$. System S' moves with $v = 0.6c$ relative to S. In S the angle between the emitted photon and the motion of S' is $\pi/3$. How large is the angle in S'?

3. **Invariance of s^2**
   Convince yourself that the distance s^2 is invariant under Lorentz-transformations.