





Physics 121. March 27, 2008.

- Homework set # 7 is now available and is due on Saturday April 5 at 8.30 am.
- Homework set # 7 has two components:
 WeBWork (75%)
 Video analysis (25%)
- Exam # 2 will be graded this weekend and the results will be distributed via email on Monday March 29.
- Make sure you pick up the results of exam # 2 in workshop next week.

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Conservation of angular momentum. Sample problem.

- The rotational inertia of a collapsing spinning star changes to one-third of its initial value. What is the ratio of the new rotational kinetic energy to the initial rotational kinetic energy?
- When the star collapses, it is compresses, and its moment of inertia decreases. In this particle case, the reduction is a factor of 3:

$$I_f = \frac{1}{2}I_i$$

and angular momentum should thus be conserved.
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• The initial kinetic energy of the star can be expressed in terms of its initial angular momentum:

$$K_{i} = \frac{1}{2}I_{i}\omega_{i}^{2} = \frac{1}{2}\frac{L_{i}^{2}}{I_{i}}$$

• The final kinetic energy of the star ca also be expressed in terms of its angular momentum:

$$K_{f} = \frac{1}{2} \frac{L_{f}^{2}}{I_{f}} = \frac{1}{2} \frac{L_{i}^{2}}{\left(\frac{1}{3}I_{i}\right)} = 3K_{i}$$

Note: the kinetic energy increased! Where does this energy come from?
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