

Question about radiation pressure

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- *From:* curiosus_2008@xxxxxxxxxx
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Question about radiation pressure

We know several examples where radiation pressure is overcoming gravity: for example the tail of comets or the formation of solar systems.

The main reason is that the effect of radiation pressure increases when the size of the particles decreases.

For example radiation pressure from the Sun is stronger than gravity for atoms of hydrogen. It is even enforced for dust grains of a particular size.

If that is true in the vicinity of the Sun, that is still true 2 MegaParsecs away, as both radiation pressure and gravity propagate as $1/d^2$.

So stars are not attracting atoms and dust, but repel these.

According to current estimations, a large part of the mass of galaxies is made of hydrogen and dust.

Now consider the effect of radiation pressure from one galaxy to another galaxy: if an important part of the galaxy is made of hydrogen, an important part of that action should be repulsion and not attraction.

So my question is:

If there is an important repulsion exerted on hydrogen and if hydrogen is prevalent, is it possible to consider that hydrogen is repelled, and is then attracting the stars of the galaxy by gravitation?

Eventually, depending on the proportion of hydrogen, it could occur that a galaxy repels another galaxy and does not attract it, or attracts it less than expected.

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Curiosus

http://www.geocities.com/curiosus_2008/