The measured temperature profile of the Sun as deduced from helioseismology is consistent with the ~15 million Kelvin core temperature required for a Sun that is entirely powered by fusion. The expected and measured temperature profiles agree to within 1% over the entire range of measurements.[9,10] So, as with the neutrino evidence, helioseismology strongly supports a Sun that is entirely fusion-powered since the p-mode observations confirm the near-core temperature.

It is also noteworthy that the neutrinos themselves are indicative of the core temperature of the Sun. Solar neutrinos are produced by a variety of nuclear fusion processes—each with its own temperature dependence. The flux of ^{8}B solar neutrinos is proportional to the ~24th power of temperature.[11] Since the SNO detects these ^{8}B neutrinos at the expected rate,[12] the core temperature of the Sun must be well constrained.

Rod Bernitt also asks about the Faint Young Sun paradox. This paradox (for evolutionists) asks how the Earth could be so warm in the distant past if the Sun was less luminous at that time. In a fusion-powered star, the composition of the core gradually changes as hydrogen is converted to helium. There is very little change on a 6,000-year timescale, but the composition changes drastically on a billions-of-years timescale. Stellar evolutionists propose that stars respond to this gradual change in core composition by becoming more luminous over billions of years—and I agree that this would be the natural result of the physics if a star were to exist that long. From an evolutionary perspective, the Sun would have been about 25% fainter 3.8 billion years ago—hence the paradox. But the effect is negligible on a 6,000-year timescale. So, this paradox is unaffected by the latest neutrino evidence. The Faint Young Sun paradox is still a valid argument against a solar system billions of years old.[13] It's an example of how the evolutionists' own assumptions lead to contradictions. It is not a problem for a 6,000-year-old hydrogen-burning star.

The energy diffusion timescale for the Sun, however, does exceed six thousand years. Calculations show that energy produced in the core of the Sun today should take more than six thousand years to diffuse to the solar surface. Does this demonstrate that the Sun is older than 6,000 years, or is not powered by fusion? Not at all. Apparently, energy being released from the photosphere today was never produced by fusion, but is energy that has come from a subsurface layer—created on Day 4 of the Creation Week. God created the Sun in a stable state with an energy and temperature profile similar to those of today. The solar photosphere is constantly emitting its energy into space by thermal radiation, and would quickly cool—except this energy is replenished by energy from a hotter layer beneath the surface. This underlying layer obtains its energy from a still hotter, deeper layer, and so on to the core, which obtains energy directly from fusion.

So, the primary purpose of fusion is *stability*. Energy produced by fusion precisely matches energy released from the surface so that the internal temperature profile of the Sun remains constant. The fusion energy flux balances the force of gravity and maintains the stable temperature profile. Energy produced by fusion is not directly responsible for heating the solar photosphere today (because there has not been enough time) though it would eventually serve that purpose if the Sun were allowed to continue far enough into the future. So, a 6,000-year-old hydrogen-burning star does not require any unusual physics during the Creation Week. A fusion-powered Sun is perfectly consistent with the Biblical timescale, and with the available evidence.

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Can more dark matter solve some problems?

Thanks for some very informative articles on cosmology in *TJ* **16**(3), 2002.

Two possible sources of dark matter with observational support were mentioned.

1. Dark matter between the bright arms of spiral galaxies, as shown by the image of a face-on spiral galaxy in front of another larger spiral galaxy in the overview 'Cosmologists can't agree and are still in doubt' by John G. Hartnett.
2. Neutrinos don't have zero rest mass and may contribute to dark matter, according to the paper 'Missing' neutrinos found! No longer an "age" indicator' by Robert Newton.

John Hartnett wrote that the 'standard model' of the universe seems to demand 22.5% dark matter, according to the big-bangers.

Do we have any reasonable guesstimate on how much the abovementioned two sources of dark matter should contribute towards the total mass/energy density of the universe?

If these two sources are taken into account, will the modification of the Newtonian equation for acceleration still be necessary as proposed in the perspective 'MOND over dark matter?' by Bill Worraker? Or should a_0, the critical acceleration level below which MOND (Modification of Newtonian Dynamics) perhaps applies, then be even smaller?

John Hartnett refers to peculiar physical associations between quasars and galaxies with greatly different redshifts, as expounded by Halton Arp.

What are the chances of them being only apparent physical associations, while in fact are caused by dark matter belonging to the closer object, giving the impression of a connection? (The closer one may even be the quasar.) Or is Halton Arp's statistical calculations and physical connections as seen in visible light, X-rays or radio waves (*TJ* **14**:(3):39–45, 2000) sufficient evidence for real proximities?

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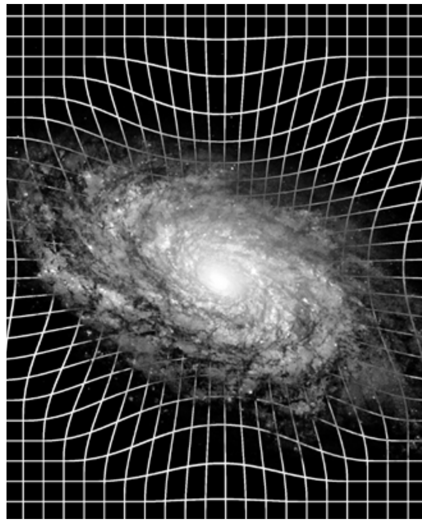

Galaxy image from NASA

John Hartnett replies:

Yes, there are some estimates of the amounts of dark matter that supposedly contribute to the total mass/energy density of the universe. In galaxies the observed dark matter is usually somewhere between 0 and 100% of the luminous matter. This dark matter is however not the type of dark matter that is sought in big bang cosmology. In galaxies astronomers seek essentially transparent matter in the form of a *spherical halo* around the galaxy. They hope that dark matter will explain the anomalies between the rotation curves and the Tully-Fisher relation which relates the fourth power of the rotation speed of the galaxy to its luminosity (and hence mass). The neutrinos you speak of maybe transparent but it is hard to conceive that neutrinos could provide the density required in a galaxy, or that they could be confined to the peculiar location required within the galaxy.

Will MOND still be necessary? Yes, MOND is an empirical description resulting from the motion of stars and gases in the outer regions of spiral galaxies. In other words, it is only describing what we observe. As yet we have no theoretical model to explain these motions. (Note: I am currently working on such a theory). But the halo 'dark' matter, though it appears to explain this, it in no way interacts with matter except gravitationally. So it cannot be observed with electromagnetic techniques. This is the same type of 'dark' matter sought in the big bang F–L models. The additional non-luminous matter, that you mention, in the arms of galaxies does not explain MOND as it is in the wrong place (though it is used as a free parameter in curve fits). The F–L cosmological models require the amount of dark (exotic) matter to be something like 7 to10 times the normal baryonic kind. It is really drawing a long bow over something that is experimentally not observed, nor for which there is any theoretical justification except an *a priori* belief in the F–L cosmologies and the big bang.

What are the chances of Arp's quasars and galaxies being only *apparent* physical associations, caused by dark matter belonging to the closer object, giving the impression of a connection? Implausible. Either they are physically associated or they are not. If they are not, the quasars are out near the edge of the universe, while most observed galaxies are relatively nearby.

In summary, can more dark matter solve some problems? The answer is no. It would only cause more problems.

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