

perspective

Let there be light

Religion, science share it as a symbol

By Howard Smith

Article Last Updated: 12/24/2006 12:08:48 AM MST

Merry Christmas from science - and a Happy Hannukah, too. Both seasonal holidays share the symbol of light in the darkness, a reminder of lights past, from the star of Bethlehem and the oil lamps of Jerusalem. Today, as our bulbs and candles illuminate the night, they also recall another light in the darkness, the miracle of the beginning of the universe, the "Let there be light!" of day one.

Holiday lights also are a moral symbol for the future. They teach the lesson that people have the ability to make a positive difference. We can, by our good deeds, shine figurative light into the darkness of the world, and make it a better place.

It might sound surprising, but that first cosmic light carries much the same religious message as does our holiday light. It, too, is a story of miraculous blessing that teaches good will towards others. Speaking as a research scientist with an appreciation of the spiritual, I find cosmology inspiring. The light of creation, enriches the message with fresh insights from modern science. This year cosmology had special gifts to proffer.

From the time of the Maccabees until the 1930s, virtually all theologians and scientists adopted the Greek view of creation: the universe is eternal and unchanging. But in 1929, Edwin Hubble discovered that galaxies are moving away from us, and Einstein's theory of relativity explained those motions. The universe was created in the remote past in a "big bang," a blaze of light from an infinitesimal speck that has expanded and evolved. Today, astronomers know that our universe is neither eternal nor static.

A few philosophers, most eloquently the Jewish theologian Maimonides in the 12th century, rejected the Greek view. He argued that "everything except God has been brought into existence out of nonexistence." Scientific knowledge, he adds, brings metaphoric light to the darkness of ignorance.

Four centuries later, the Kabbalists of Safed, Israel, building on their long mystical tradition, explicated the first words of the Bible. They wove an intricate account of how the universe was created with light from an infinitesimal speck, and described its expansion and evolution with light into today's universe. The Kabbalists explain that because the universe is evolving, we can make a difference to its progress.

Imperfections were embedded in the fabric of the newly born universe.

Humanity's task, they say, is *tikkun olam*, healing these breaches in the world through righteousness. By our good deeds we invoke the spirit of the light of creation.

Astronomers now understand that light in the embryonic cosmos was scattered by hot plasma like headlights in a fog. About 380,000 years after creation, once things had cooled and atoms could assemble, light traveled freely. That light, dating from a time about 8 billion years before the birth of the sun, is seen by astronomers today as the "cosmic microwave background radiation." Discovered in 1965, the light has become a key scientific diagnostic of what happened way back then.

Just last March, scientists announced the latest results from analyzing this cosmic light, including a more precise age of the universe: 13.7 billion years, plus or minus about 1 percent. Last month, the 2006 Nobel Prize in physics went to two astronomers who measured this radiation.

Light is surprisingly rich as a religious metaphor, and modern science helps explicate its symbolism. Light, whether from the creation, starlight, bulbs, or candles, is much more than just a visible glow. It is electromagnetic radiation, and we can measure it across nearly 80 octaves in frequency. Visible light is merely one octave. If light were music of a truly grand piano, then the notes of the visible octave our eyes perceive come from only 12 keys of a piano whose remaining octaves and keys would stretch nearly the length of a football field.

Physics also understands that there are three other forces in the universe besides electromagnetism: gravity and two nuclear forces, each with its own kind of "light."

Science's precise methodology prompts another holiday reflection. Its respectful, intellectual openness and quantitative inquiry have been wonderfully productive and are worthy of emulation. Yes, its objective seeking has uncovered deep new puzzles: the existence of "dark matter," for example, and an outward acceleration of the distant cosmos. But both the answers and questions increase our confidence in the methods of science. The new questions also remind us that we do not know it all.

In this season of light may good deeds, like the lights of trees, menorahs and the wondrous creation, illuminate the darkness. Let there be light.

Howard Smith (howardsmith@letherebelightbook.com) was the chairman of astronomy at the Smithsonian's National Air and Space Museum.



This is an artist's impression of how the very early universe, less than 1 billion years old, might have looked when it went through an onset of star formation, converting primordial hydrogen into myriad stars at an unprecedented rate. The Big Bang, the theoretical start of the universe, was followed by 100 million years of blackness, when there were no stars, planets or galaxies. That dark age ended with an explosion of light from stars bursting into life, lighting the universe like a fireworks show. (AP / NASA, Adolf Schaller)

Print Email Return to Top » Subscribe