

Nir Shaviv

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Nir Joseph Shaviv (Hebrew: נִיר יוֹסֵף שָׁבִיב, born July 6, 1972) is an Israeli-American physics professor, carrying out research in the fields of astrophysics and climate science. He is a professor at the Racah Institute of Physics of the Hebrew University of Jerusalem.^[1] From 2014 he is also a member of the Institute for Advanced Study in Princeton.

He is best known for his solar and cosmic-ray hypothesis of climate change. In 2002, Shaviv hypothesised that passages through the Milky Way's spiral arms appear to have been the cause behind the major ice-ages over the past billion years. In his later work, co-authored by Jan Veizer, a low upper limit was placed on the climatic effect of CO₂.^[2]

His best known contribution to the field of astrophysics was to demonstrate that the Eddington luminosity is not a strict limit,^[3] namely, that astrophysical objects can be brighter than the Eddington luminosity without blowing themselves apart. This is achieved through the development of a porous atmosphere that allows the radiation to escape while exerting little force on the gas. The theory was correctly used to explain the mass-loss in Eta Carinae's giant eruption, and the evolution of classical nova eruptions.^[4]

Shaviv was interviewed for *The Great Global Warming Swindle* documentary. In the film he states:

“ A few years ago if you would ask me I would tell you it's CO₂. Why? Because just like everyone else in the public I listened to what the media had to say.^[5] ”

In 2012, he contributed, along with Werner Weber, Henrik Svensmark and Nicola Scafetta, to the book *Die kalte Sonne. Warum die Klimakatastrophe nicht stattfindet* (The Cold Sun) of Fritz Vahrenholt and Sebastian Lüning, a book expressing skepticism of anthropogenic global warming, which attracted considerable interest in Germany.^[6]

Nir Shaviv



Nir Shaviv, 2009

Born	July 6, 1972 Ithaca, New York
Nationality	Israeli American
Fields	Astrophysics
Institutions	Hebrew University of Jerusalem
Influences	Jan Veizer Henrik Svensmark

Contents

- 1 Cosmic Rays and Climate

- 2 Solar variation and Climate Sensitivity
- 3 Eddington Luminosity Limit
- 4 Education and Career
- 5 Prizes and Awards
- 6 Selected papers
- 7 Lectures (Selection)
- 8 See also
- 9 References
- 10 External links

Cosmic Rays and Climate

Shaviv has been one of the proponents of a cosmic ray climate link. In 2003 he has shown that the cosmic ray flux over the past billion years can be reconstructed from the exposure ages of Iron meteorites, that these flux variations are expected from spiral arm passages, and they correlate with the appearance of ice age epochs on Earth.^[7] In a later work with Ján Veizer, it was demonstrated that the temperature reconstruction over the Phanerozoic correlates with the cosmic ray flux, but it does not correlate with the CO₂ reconstruction, thus placing an upper limit on the effects of CO₂.^[2] This prompted several reactions by the climate community and rebuttals by Shaviv and his colleagues.^[8]

He has also shown^[9] that the Cosmic Ray climate link explains part the faint sun paradox, since the slowly decreasing solar wind will give rise to a cooling effect that compensates the solar irradiance increase. Moreover, long term star formation activity in the Milky Way correlate with long term climate variations.

In a more recent work with Andreas Prokoph and Ján Veizer,^[10] it was argued that the reconstructed temperature has a clear 32 million year oscillation that is consistent with the solar system's motion perpendicular to the galactic plane. The oscillation also appears to have a secondary modulation consistent with the radial epicyclic motion of the solar system.

Solar variation and Climate Sensitivity

Because the existence of a significant cosmic ray climate link implies that solar variability will also have a large effect on the climate, Shaviv advocated the idea that natural climate variations play a significant role in 20th century climate change. Moreover, if solar activity increase over the 20th century contributed to warming in addition to the anthropogenic forcing, then the overall climate sensitivity should be lower than advocated by standard scenarios which do not include solar forcing.^[11]

In 2008, Shaviv used the oceans as a giant calorimeter to quantify the solar radiative forcing. He found that the peak to peak variations are close to 1 W/m², significantly more than can be expected from the changes in the solar irradiance.^[12] In 2011 he has shown together with Shlomi Ziskin that the solar variability explains about half the 20th century warming, with the other half attributable to anthropogenic forcing^[13].

Shaviv's solar hypothesis has been disputed by Mike Lockwood and Claus Froehlich in an analysis of the sun's output over the last 25 years. They argue that the sun's activity has been decreasing since 1985 while global temperatures have continued to rise.^[14] Shaviv argues that Lockwood and Froehlich's analysis is flawed for a number of reasons.^[15] Firstly, while sunspot activity declined after 1985, cosmic ray flux reached a minimum in 1992 and contributed to warming during the 1990s. Secondly, Shaviv argues that short term variations in radiative forcing are damped by the oceans, leading to a lag between changes in solar output and the effect on global temperatures. While the 2001 maximum was weaker than the 1990 maximum, increasing solar activity during previous decades was still having a warming effect, not unlike the lag between noon and the hottest hour of the day. The recent lack of warming is consistent with the decreased solar activity.

Eddington Luminosity Limit

In 1999 Shaviv has shown that inhomogeneities in stellar atmospheres reduce the effective opacity and thus increase the Eddington luminosity.^[16] Shaviv later showed that atmospheres are inherently unstable as the Eddington luminosity is approached,^[17] that these atmospheres will develop continuum driven winds that explain the appearance of eta-Carinae and classical nova eruptions.^[4]

In 2010 Shaviv made the prediction that Type IIn supernova should have super-Eddington outbursts before the main supernova explosions since the super-Eddington states can naturally explain the circum-stellar material present around the supernova at the time of explosion (Giving the narrow lines observed in the spectrum, i.e., the “n” in the Type IIn).^[18] Such precursors were later detected with the Palomar Transient Factory, making them the first systematically detected supernova precursors.^[19]

Education and Career

Shaviv studied, during 1987–90, physics at the Israel Institute of Technology in Haifa and finished his BA as best in class. During his military service (1990–93) he continued his studies 1992 and co-authored his first papers in astrophysics. In 1994 he received a Master of Science in physics and a doctorate during 1994–96. During 1996–99 he was a Lee DuBridge Prize Fellow at Caltech's TAPIR (Theoretical Astrophysics) group. During 1999–2001 he was in a postdoctorate position at the Canadian Institute for Theoretical Astrophysics. In 2001–6 he was a senior lecturer at Racah Institute of physics at the University of Jerusalem. In 2006-2012 he was an associated professor, and full professor since 2012. Between 2008 and 2011 he was the head of the faculty union of the Hebrew University, and he served as the chairman of coordinating council of faculty unions between 2010 and 2014. In 2014 he became a member of the Institute for Advanced Study in Princeton.

Prizes and Awards

- 1996 Wolf foundation award for excellence as PhD student
- 1996 Lee A. DuBridge scholarship at Caltech
- 2000 Beatrice Tremaine scholarship in Toronto
- 2004 Siegfried Samuel Wolf lecture for nuclear physics

- 2014 IBM Einstein Fellowship, Institute for Advanced Study, Princeton

Selected papers

- Elphick, C; Regev, O. & Shaviv, Nir J (1992), "Dynamics of Fronts in Thermally Bistable Fluids", *The Astrophysical Journal* **392** (1): 106, Bibcode:1992ApJ...392..106E (<http://adsabs.harvard.edu/abs/1992ApJ...392..106E>), doi:10.1086/171410 (<https://dx.doi.org/10.1086%2F171410>)
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Lectures (Selection)

- Shaviv, Nir J (August 2003), "Climate Change and the Cosmic Ray Connection", *International Seminar on Nuclear War and Planetary Emergencies – 30th session*, Erice, Italy: Ed. R. Ragaini, World Scientific (invited)

See also

- List of scientists opposing the mainstream scientific assessment of global warming

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External links

- Sciencebits.com (<http://sciencebits.com/>), Shaviv's weblog
- Shaviv's home page (<http://www.phys.huji.ac.il/~shaviv>) at the Hebrew University

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| People from Ithaca, New York | Hebrew University of Jerusalem faculty

| Climate change skeptics (scientists) | Israeli astrophysicists | Israeli people of American descent

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