



Prof. Pierre Jean Léna

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#### **Most important awards, prizes and academies**

*Awards:* Officier de la Légion d'honneur; Commandeur de l'Ordre du Mérite; Commandeur de l'Ordre du Lion (Sénégal); Prix Deslandres et Henri de Parville, Académie des sciences; Prix Maurice Pérouse, Fondation de France; Prix Holweck, Société française de physique/Institute of Physics; Médaille Janssen, Société astronomique de France; Médaille Erasmus de l'Academia Europaea. *Academies:* Académie des sciences, Paris (1991); Academia Europaea (1991); Pontifical Academy of Sciences (2001); Foreign Corresponding Member, Academia Nacional de Ciencias Exactas, Físicas y Naturales de Buenos Aires (2005); Academia Nacional de Educación, Argentina (2005); Academia de Ciencias Físicas, Matemáticas y Naturales de Venezuela (2015); Academia Chilena de Ciencias (2016); Academies of sciences of Serbia (2015) and the Ukraine (2020).

#### **Summary of scientific research**

The scientific work of Pierre Léna is centred on infrared astronomy, a major branch of astronomy born in about 1960. With novel observations, he helped to model the solar atmosphere and its temperature minimum, then switched to the far infrared emission of molecular clouds in our Galaxy and the diffuse emission of interstellar medium observed with an airborne telescope. Adapting to

infrared the speckle interferometry discovered by the French scientist Antoine Labeyrie, he was the first, with his students, to apply it to star formation and to measure the size of dust cocoons around forming stars. This work led him to organize the European Very Large Telescope as an interferometer, again following Labeyrie's ideas. This is the world's most powerful instrument and is now operating. He then worked on a new interferometer, connecting with optical fibres large telescopes on Mauna Kea (Hawaii). Beginning in 1984, he led a team which was the first to implementing adaptive optics on a telescope, a technique now adopted worldwide on giant instruments. With his students, he applied it to various astronomical objects. As an experimental physicist, he contributed to numerous techniques required by infrared astronomy, such as bolometers, Fourier spectrometers, bi-dimensional arrays, and air- and space-borne instruments. He represented France on the governing Council of the European Southern Observatory (1986-1993), and directed the Graduate School of Astrophysics at Université Paris 7 (1976-1984 and 1992-1996) before becoming Director of the École Doctorale Astronomie d'Ile-de-France. His interest in educational matters led him to become President of the Institut National de Recherche Pédagogique (1991-1997) and to be an active member of *La Main à la Pâte* activity designed to renovate science education in schools since 1996. He was President of the Société Française de Physique in 1989 and from 2003 to 2007 President of the Comité d'éthique du CNRS. He built and was in charge of the Education office at the French Académie des sciences and became (2011) then President of the new Foundation *La main à la pâte* for science education, established by the French Académie. In 2018, he founded a new enterprise, the Office for Climate Education, a UNESCO Center since 2020, aimed at teachers and developing tools for climate education in schools. Both activities led to collaborations related to science education in over 50 countries.

## Main publications

*Articles:* Eddy, J., Léna, P. and McQueen, R.M., Far infrared measurement of the solar minimum temperature, *Solar Physics*, 10, pp. 330-41 (1969); Léna, P., Le rayonnement continu de la photosphère solaire, *Astron. Astrophys.*, 4, pp. 202-19 (1970); Turon, P. and Léna, P., First observation of the granulation at 1.65 micrometers. Center to limb variation of the contrast, *Solar Physics*, 30, pp. 3-14 (1973); Léna, P. *et al.*, The thermal emission of the dust corona during the eclipse of June 30, 1973, 1, *Astron. Astrophys.*, 37, pp. 75-9 (1974); Rouan, D., Léna, P., Puget, J.L., de Boer, K. and Wijnbergen, J., Far infrared observations of the galactic plane and molecular cloud S 140, *Ap. J.*, 213, L35-39 (1977); Chelli, A., Léna, P. and Sibille, F., Angular dimensions of accreting young stars, *Nature*, 278, pp. 143-6 (1979); Sibille, F., Chelli, A. and Léna P., Infrared speckle interferometry, *Astron. Astrophys.*, pp. 315-28 (1979); Chelli, A., Perrier, C. and Léna, P., The sub-arcsecond structure of I Rc at 5  $\mu$ m, *Astrophys. J.*, 280, p. 163 (1984); Jiang Dong-rong, Perrier, C. and Léna, P., NGC2024 IRS2, Infrared speckle interferometry and nature of the source, *Astron. Astrophys.*, 135, pp. 249-54 (1984); Roddier, F. and Léna, P., Long baseline Michelson interferometry with large ground based telescopes at optical wavelengths, I & II, *Journ. Optics*, 15, pp. 171-82 & pp. 363-74 (1984); Léna, P. and Merkle, F., The interferometric mode of the European Very Large Telescope, *Astroph. Sp. Sc.*, 160, pp. 363-8 (1989); Rousset, G.,

Fontanella, J.C., Kern, P., Gigan, P., Rigaut, F., Léna, P. *et al.*, First diffraction-limited astronomical images with adaptive optics, *Astron. Astrophys.*, 230, L29-32 (1990); Gendron, E. and Léna, P., Astronomical adaptive optics. I. Modal control optimization, *Astron. Astrophys.*, 291, pp. 337-47 (1994); Mariotti, J.-M., Coudé du Foresto, V., Perrin, G., Zhao, P. and Léna, P., Interferometric connection of large ground based telescopes, *Astron. Astrophys. Suppl. Series*, 116, pp. 381-93 (1996); Clénet, Y., Rouan, D., Gendron, E., Montri, J., Rigaut, F., Léna, P. and Lacombe, F., Adaptive optic L-band observations of the Galactic Center region, *Astron. Astrophys.*, 376, p. 124 (2001); Glanc, M., Gendron, E., Lacombe, F., Lafaille, D., Le Gargasson, J.F. and Léna, P., Towards wide field retinal imaging with adaptive optics, *Opt. Comm.*, 230, pp. 225-38 (2004); since 2016, partner of the scientific publications *Collaboration Gravity; Changement climatique et éducation* (2020); *Education as a strategy for climate change mitigation and adaptation* (2021). *Books: Lumières. Une introduction aux phénomènes optiques*, avec A. Blanchard, InterEditions, 1990; *Astrophysique: méthodes physiques de l'observation*, 2e éd. 1996, avec F. Lebrun & F. Mignard, EDP, Paris (English translation); *Astrophysical Observation*, Springer, 1998 (translated in Chinese, National Institute for Compilation and Translation, Taiwan, 2004 and Beijing 2015). A revised edition was published in French in 2008 (L'Observation en astrophysique) and translated in English in 2012 (Springer); *Adaptive optics for Astronomy* (F. Roddier, ed.), Cambridge University Press, 1998; *Concorde 001 et l'ombre de la Lune* (2014), translated into English as *Racing the Moon's shadow with Concorde 001; Une Histoire de Flou. Miroirs, trous noirs et autres mondes* (2019), translated in English as *Astronomy's Quest for Sharp Images. From Blurred Pictures to the Very Large Telescope* (2020). *Other Publications: L'espace pour l'homme*, coll. Dominos, Flammarion (1993) (translated in Korean and Portuguese); *La main à la pâte. L'enseignement des sciences à l'école primaire*, ouvr. coll. présenté par G. Charpak, Flammarion (1996) (translated in Portuguese, Vietnamese, Arabic and Chinese); O. Charpak, P. Léna, Y. Quéré, *L'Enfant et la Science. L'aventure de La main à la pâte*, ed. Odile Jacob, 2005; *Les Sciences du ciel*, sous la direction de P. Léna, Flammarion (1996); *Le Trésor*, dictionnaire des sciences, ouvr. coll. dirigé par Michel Serres et Nayla Farouki, Flammarion (1997); *Paysages des sciences*, ouvr. coll. dirigé par Michel Serres & Nayla Farouki, Le Pommier (1999); *La science*, Yang Huanming and Pierre Léna, Desclée de Brouwer (2003), published simultaneously in Chinese, Presses de Shanghai; *Eclipse 73* (CERIMES, Paris); *Tours du Monde, Tours du Ciel*, a ten-hour program for television, in collaboration with Michel Serres, author and director R. Pansard-Besson (1990 and 2009). EDP Sciences (2009).