



## Pierre Léna

Elected at the Académie April 15, 1991, section Sciences de l'univers

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### Professional carrier

Born in Paris (France) in 1937, Pierre Léna joined the École normale supérieure (Ulm) in Paris where he studied physics from 1956 to 1960. He passed his *Agrégation de sciences physiques* in 1960 (rank 3) and became a civil servant, teaching physics at the Sorbonne (1960-1966). He began to prepare his Doctorat d'État under the supervision of Prof Jean-Claude Pecker in Paris Observatory and spent three years (1966-1969) in United States, at the Kitt Peak National Observatory (Arizona), then at High Altitude Observatory (Boulder) in order to gather data for his Doctorat, which he defended in 1969 on the topic *Recherches sur le rayonnement continu du Soleil entre 1,5 et 500 micromètres*. Back in France at the Université Paris Sud (Orsay), he became full Professor at the new Université Paris VII in 1973, at the age of 35. He remained in this University until the age of retirement in 2004. He taught physics and astrophysics at all levels and in 1996 became Head of the Graduate school of astrophysics *Ecole doctorale Astronomie & Astrophysique d'Ile-de-France*, preparing a large fraction of the future researchers in this field for France.

Pierre Léna is the father of four children and the grand-father of eleven ones.

### Research

He joined in 2005 the Observatoire de Paris at Meudon. After the Doctorat, he progressively developed a group exploring the, then entirely new, field of infrared astronomy. This domain will become the heart of his future work and accomplishments, with telescopes on the Earth's surface, as well as on aircrafts or satellites. After measuring the minimum temperature of the solar atmosphere, he developed in France an airborne observatory (1970-1980) which produced a wealth of results on the interstellar medium in the Galaxy. In 1973, he proposed to use the prototype of the supersonic aircraft Concorde to observe a total solar eclipse with an unprecedented duration : the flight of June 30, 1973 over Africa got a record of 74 minutes of totality and produced a wealth of scientific data. During the early 1980s, he contributed to prepare the instruments for the first space infrared observatory, the European mission ISO, to be launched with great success in 1995.

He then turned his attention to the very high angular resolution in astronomical images, following new optical methods created by his colleague Antoine Labeyrie in France. These methods allowed to push the resolution of large ground based telescopes to their ultimate theoretical limit. During the period 1980-1995, he devoted most of his energy to apply them to the design of the *European Very Large Telescope*, inaugurated in 1998 by the *European Southern Observatory* in Chile (ESO). With a team of colleagues, students, engineers, he introduced the new technique of adaptive optics on the VLT telescopes, obtaining an unprecedented resolution. This technique is now used worldwide and has allowed the



planning of ground-based optical telescopes of ever increasing size (today up to 40 m diameter). He also impulsed the implementation of an interferometric mode on the VLT, providing a resolution of an equivalent 200-m telescope , and contributing to make the VLT the most powerful optical observatory of the world in 2012. These two revolutionary

techniques led to more than a dozen PhDs which he supervised. He represented France at the ESO Council from 1986 to 1993, and was a member of numerous scientific committees, in France, in Europe and in the USA, as well as President of the *Société française de physique* in 1989.

## Supporting science education

Pierre Léna had a continued interest for education. As University Professor, he wrote several books for students and introduced lectures for professional development of science teachers (1976-1980). He participated to various TV productions, the most known being the series of 10 movies, 52 minutes each, called *Tours du Monde*, *Tours du Ciel* and done with the philosopher and science historian Michel Serres, which had a great success in 1991.

In 1992, he became President of the *Institut national de recherche pédagogique* (1992-1997), a national institution for pedagogical research, where he renewed the interest for science education. After being elected at the Académie des sciences in 1991 for his scientific achievements, he joined in 1996 the physicists Georges Charpak, Nobel Prize in physics 1992, and Yves Quéré to create *La main à la pâte*, a nation-wide movement to renovate science education in French primary schools. This initially small venture became a worldwide enterprise which in 2013 has collaborations with over 50 countries. In 2012, the French Académie des sciences, along with the Écoles normales supérieures in Paris and Lyon, created the *Fondation La main à la pâte* to manage and amplify this success. He became in 2011 the first President of the Fondation, and became Honorary President in 2014.

In 2005, the French Academy des sciences created a permanent and operational structure to deal with science education issues : the *Délégation à l'éducation et la formation*. He was elected Head of this body, implemented and developed it during his term (2005-2011). In this capacity, he was involved in many official decisions and statements from the Académie regarding science curricula, teacher's vocational training and professional development, international relations. After contributing to the creation of the Science Education Program of IAP, the global network of science Academies, he became Chair of this global program in 2011. In 2009, he created a network of European Academies, within ALLEA, to deal with education issues, both inside Europe, especially through the European Commission in Brussels, and in cooperation with emerging countries.

Science and education led him naturally to ethics, and he became in 2005 president of the Comité d'Éthique (COMETS) of the CNRS. Having trained many PhDs in the Graduate School of Astrophysics, he paid attention to their jobs and careers, and was elected Vice-President (2003-2007) of the Association *Bernard-Grégoire*, a public service for helping students to prepare for jobs and to find them.



## Distinctions

Pierre Léna has been distinguished by the France-UK Holweck Prize, the Academia Europeae Erasmus Medal, the Ordre national de la Légion d'honneur (Officier) and the Ordre national du Mérite (Commandeur) in France. He is Commandeur de l'Ordre du Lion (Sénégal). The program *La main à la pâte* received in 2009 the Prix PurKwa Pour l'alphabétisation scientifique des enfants de la planète. He was elected in 2003 Member of the Pontifical Academy of Sciences (Vatican) and in 2005 member of the Academia Europeae. He is Foreign Member of Société Royale des Sciences (Liège, Belgium), Academia de Educacion (Buenos-Aires), Academia Nacional de Ciencias Exactas, Fisicas y Naturales (Argentina), Academia de Ciencias Fisicas, Matematicas y Naturales (Venezuela), the latter reflecting his strong involvement to develop basic science education in Latin American countries.

## Some of the publications of Pierre Léna

### Books

- *Enseigner c'est espérer. Plaidoyer pour l'école de demain*, Le Pommier, 2012
- *Dix notions-clés pour enseigner la science* (collectif, dir. W Harlen), traduction en français par Pierre Léna, Le Pommier, 2011.
- Alain Aspect et al. *Demain la physique* (coord. Edouard Brézin, Sébastien Balibar), 2nd édition revue, Paris, Odile Jacob, 2010.
- 29 notions-clés pour savourer et faire savourer la science, Pierre Léna, Yves Quéré et Béatrice Salvat, Paris, Le Pommier, 2009 (trad. en espagnol).
- *Ciel ! mon étoile*, Cécile Léna, Michel Serres, Pierre Léna - ELYTIS, Bordeaux, 2009.
- *Éthique et changement climatique*, (collectif), Paris, Le Pommier, 2009.
- *L'observation en astronomie*, Ouvr. coll. sous la dir. de Pierre Léna, Ellipses, Paris, 2009.
- Béatrice Ajchenbaum-Bofetty, Pierre Léna (coord.), *Education, sciences cognitives et neurosciences*. Sous l'égide de l'Académie des sciences. Presses universitaires de France (2008)
- *L'observation en astrophysique*, Pierre Léna et al., 3e éd. EDP Sciences 2008 (2e éd. 1996, traduit en chinois 2004; 3e éd. traduit en anglais 2012).
- *L'Enfant et la Science. L'aventure de La main à la pâte*. Avec G. Charpak & Y. Quéré, Ed. O. Jacob, Paris, 2005. Traduit en espagnol *El Niños y la Ciencia*, Siglo Veinteuno, Madrid-Buenos-Aires, 2007.
- Pierre Léna & Yang Huanming *La science*, Coll. Proches lointains, 2003, Desclée de Brouwer. Traduit en chinois (Shanghai).
- *Sur les traces du vivant. De la Terre aux étoiles*, Florence Raulin-Cerceau, Pierre Léna, Jean Schneider, Paris, Le Pommier, 2002.
- *Graines de sciences 2*. Avec I. Blanc et D. Jasmin, Paris, Le Pommier, 2000.
- *Paysages des sciences*, Ouvr. coll. dirigé par Michel Serres & Nayla Farouki, Paris, Le Pommier, 1999.
- *Graines de sciences 1*. Avec Y. Quéré et I. Catala, Paris, Le Pommier, 1999 (traduit en vietnamien....).



- *Le Trésor, dictionnaire des sciences*. Ouvr. coll. dirigé par Michel Serres & Nayla Farouki. Paris, Flammarion, 1997.
- *Les Sciences du ciel*. Sous la direction de Pierre Léna, Paris, Flammarion, 1996.
- *La main à la pâte. L'enseignement des sciences à l'école primaire*. Ouvr. coll. présenté par G.Charpak, Paris, Flammarion, 1996 (traduit en portugais, vietnamien, arabe, chinois). Nouvelle édition 2012.
- *L'espace pour l'homme*, coll. Dominos , Paris, Flammarion, 1993 (traduit en coréen et portugais).
- Andrei Sakharov, Edgar Elbaz, Jean Iliopoulos, Yves Quéré, *Science et Liberté* (coord. P Léna), Les Éditions de Physique, Paris, 1990.

#### **Some articles**

- EDDY, J., LENA, P., MCQUEEN, R.M. Far infrared measurement of the solar minimum temperature, *Solar Physics*, 10, 330-341, 1969
- LENA, P. et al, The thermal emission of the dust corona during the eclipse of June 30, 1973, *I. Astron.Astrophys.*, 37, 75-79, 1974
- ROUAN, D. LENA, P., PUGET, J.L., DE BOER, K., WIJNBERGEN, J. Far infrared observations of the galactic plane and molecular cloud S140, *Ap.J.*, **213**, L35-39, 1977
- CHELLI, A., LENA, P., SIBILLE, F. Angular dimensions of accreting young stars, *Nature* (1979) **278**, 143-146
- LENA, P., MERKLE, F., The interferometric mode of the European Very Large Telescope, *Astroph.Sp.Sc.*, **160**, 363-368, 1989
- ROUSSET, G., FONTANELLA, J.C., KERN, P., GIGAN, P., RIGAUT, F., LENA, P. et al, First diffraction-limited astronomical images with adaptive optics, *Astron.Astrophys.*, **230**, L29-32, 1990.
- MARIOTTI, J.-M., COUDE DU FORESTO, V., PERRIN, G., ZHAO, P., LENA, P., Interferometric connection of large ground based telescopes, *Astron.Astrophys.Suppl.Series*, **116**, 381-393, 1996.
- CLENET, Y., ROUAN, D., GENDRON, E., MONTRI, I., RIGAUT, F., LENA, P., LACOMBE, F. Adaptive optics L-band observations of the Galactic Center region, *Astron.Astrophys.* 376, 124-135, 2001.
- GLANC, M., GENDRON, E., LACOMBE, F., LAFAILLE, D., LE GARGASSON, J.F, LENA, P. Towards wide field adaptive optics imaging of the retina, *Optics Comm.*, 230, 225-238, 2003.

#### **Media**

- *Eclipse 73*, film documentaire réalisé par M.Dassonville, collab. Jean Rösch, Service du Film de recherche scientifique & CERIMES, Paris, 1974.
- *Tours du Monde, Tours du Ciel*. Dix heures d'émission pour la télévision, en collaboration avec Michel Serres. Auteur et réalisateur R.Pansard-Besson. La Sept/France3, dix cassettes Hatier/Arte, 1990. Republié en 2009, EDP Science, Paris.
- *Tours du Monde, Tours du Ciel II*, Auteur et réalisateur R.Pansard-Besson. 2009, Arte Télévision & EDP Science.

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