2021 Abel Prize

The Norwegian Academy of Science and Letters in Oslo, Norway has awarded the Abel Prize for 2021 to László Lovász, Hungary and Avi Wigderson, USA. The prize has a cash award of 7.5 million Norwegian kroner (USD 870,000). In the 1970s, when Wigderson and Lovász commenced their careers, theoretical computer science and pure mathematics were almost entirely distinct disciplines. Now, the two disciplines are interwoven, with many contributions coming from the duo complementing each other. The citation is as follows: 'for their foundational contributions to theoretical computer science and discrete mathematics, and their leading role in shaping them into central fields of modern mathematics'.

Wigderson was born in Haifa, Israel, in 1956. He is the Herbert H. Maass Professor in the School of Mathematics at the Institute for Advanced Study (IAS) in Princeton, New Jersey, USA and leads the IAS program in Computer Science and Discrete Mathematics. Wigderson is recognized for his contributions to the major areas of computational complexity theory, including randomized computation, algorithms and optimization, circuit complexity, proof complexity, quantum computation, cryptography and understanding of fundamental graph properties[1]. He has been able to address questions concerning the power and limitations of algorithms. He also investigated the applied aspects such as distributed computing in adversarial environments, which is related to the foundations of cryptography. The works of Wigderson have impacted diverse areas such as digital innovations in industry, medicine, online communications and electronic commerce[2]. Wigderson is a recipient of many awards including, Nevanlinna Prize (1994), Gödel Prize (2009) and Knuth Prize (2019).

The inauguration of the International Centre for Theoretical Sciences, Bengaluru, India took place in December 2009. The inauguration was marked by the event 'Science without Boundaries', where specialists discussed the place of cross-fertilization in research and the significance of theoretical sciences. Wigderson gave a public lecture titled, 'The P versus NP problem: efficient computation and the limits of human knowledge' (see ref. 3). The class P consists of problems which can be solved efficiently in a reasonable time whereas the class NP consists of problems, whose solutions can be efficiently verified. To date, it is not known if NP is equal to N.

Lovász was born in 1948 in Hungary. He is at the Eötvös Loránd University in Budapest, Hungary. Influenced by the legendary mathematician Paul Erdős (whom he met in 1963), Lovász started his journey of prolific publications in 1965 with several single-author papers on graph theory. In collaboration with Erdős in the 1970s, Lovász developed complementary methods to Erdős's existing probabilistic graph theory techniques. Lovász's research led to profound results in areas including combinatorial optimization, algorithms, complexity, graph theory and random walks. These areas span mathematics and theoretical computer science. One of his most famous works is the 'LLL algorithm' whose name is derived from the names of the three authors: Arjen K. Lenstra, Hendrik W. Lenstra and László Lovász[4]. This paper dealing with the factorization of the polynomials with rational coefficients has numerous applications. Lovász is a recipient of many awards including, Wolf Prize (1999), Knuth Prize (1999), Gödel Prize (2001) and Kyoto Prize (2010).

Lovász has immense contributions to diverse areas of mathematics and computer science. His contributions are part and parcel of standard textbooks in both the fields[5]. He has also impacted the popularization of science and science policy. In 2014, Lovász was elected President of the Hungarian Academy of Sciences (HAS). In 2003, HAS in partnership with UNESCO and ICSU (International Council for Science), initiated a unique forum series on global science policies known as the World Science Forum (WSF, https://worldscienceforum.org/), organized biannually in Budapest, Hungary. Since 2013, it is being held at locations between Budapest and partner countries (2013 in Brazil, 2017 in Jordan and in 2021, it is scheduled to be held in South Africa). Under the leadership of Lovász, the WSF has transformed into a gigantic event. Now, it attracts thousands of participants from over one hundred countries. The WSF also serves as a venue for the award ceremonies of the two prestigious awards namely the UNESCO Kalinga Prize for the Popularization of Science and the UNESCO Sultan Qaboos Prize for Environmental Conservation[6] respectively.

The Abel Prize was instituted in 2001 in honour of the Norwegian mathematician Niels Henrik Abel (1802–1829). Along with the Fields Medal (first given in 1936), the Abel Prize is considered to be the highest award in mathematics. The inaugural prize was given to Jean-Pierre Serre in 2003. Among the twenty-four recipients, Karen Keskulla Uhlenbeck is the only woman laureate, who received the honour unshared in 2019. Sathamangalam Ranga Iyengar Srinivasa Varadhan is the only recipient of Indian (and Asian) origin to have won the prize (unshared in 2007)[7]. Six of the twenty-four Abel Laureates are Fields medalists (Jean-Pierre Serre, Sir Michael Francis Atiyah, John Griggs Thompson, John Willard Milnor, Pierre Deligne and Grigory Aleksandrovich Margulis). The deadline for nomination is 15 September each year (https://www.abelprize.no/).

1. Reingold, O., Vadhan, S. and Wigderson, A., *Ann. Math.*, 2002, **155**(1), 157–187; doi:10.2307/3062153.
2. Wigderson, A., *Mathematics and Computation: A Theory of Revolutionizing Technology and Science*, Princeton University Press, USA, 2019; https://doi.org/10.2307/j.ctvckq7xb.
3. Malhotra, R., *Curr. Sci.*, 2010, **98**(7), 887–888.
4. Lenstra, A. K., Lenstra Jr, H. W. and Lovász, L., *Math. Ann.*, 1982, **261**(4), 515–534; doi:10.1007/BF01457454.
5. Bárány, I., Katona, G. O. and Sali, A. (eds), *Building Bridges II: Mathematics of László Lovász*, Springer Nature, 2020, vol. 28; http://dx.doi.org/10.1007/978-3-662-59204-5.
6. Khan, S. A., *Curr. Sci.*, 2020, **118**(12), 1867; 2018, **114**(2), 252; 2016, **110**(1), 15.
7. Karandikar, R. L., *Curr. Sci.*, 2007, **92**(10), 1328–1330.

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