The EATCS Award 2021

Laudatio for Toniann (Toni) Pitassi

The EATCS Award 2021 is awarded to

Toniann (Toni) Pitassi

University of Toronto, as the recipient of the 2021 EATCS Award for her fundamental and wide-ranging contributions to computational complexity, which includes proving long-standing open problems, introducing new fundamental models, developing novel techniques and establishing new connections between different areas. Her work is very broad and has relevance in computational learning and optimisation, verification and SAT-solving, circuit complexity and communication complexity, and their applications.

The first notable contribution by Toni Pitassi was to develop lifting theorems: a way to transfer lower bounds from the (much simpler) decision tree model for any function f, to a lower bound, the much harder communication complexity model, for a simply related (2-party) function f'. This has completely transformed

our state of knowledge regarding two fundamental computational models, query algorithms (decision trees) and communication complexity, as well as their relationship and applicability to other areas of theoretical computer science. These powerful and flexible techniques resolved numerous open problems (e.g., the super quadratic gap between probabilistic and quantum communication complexity), many of which were central challenges for decades.

Toni Pitassi has also had a remarkable impact in proof complexity. She introduced the fundamental algebraic Nullstellensatz and Ideal proof systems, and the geometric Stabbing Planes system. She gave the first nontrivial lower bounds on such long-standing problems as weak pigeon-hole principle and models like constant-depth Frege proof systems. She has developed new proof techniques for virtually all proof systems, and new SAT algorithms. She found novel connections of proof complexity, computational learning theory, communication complexity, circuit complexity, LP hierarchies, graph theory and more.

In the past few years Toni Pitassi has turned her attention to the field of algorithmic fairness, whose social importance is rapidly growing, in particular providing novel concepts and solutions based on causal modelling.

Summarising, Toni Pitassi's contributions have transformed the field of computational complexity and neighbouring areas of theoretical computer science, and will continue to have a lasting impact. Furthermore, she is an outstanding mentor, great teacher and a dedicated TCS community member.

The EATCS Award Committee 2021

- Johan Håstad

- Marta Kwiatkowska (chair)

- Éva Tardos

The EATCS Award is given to acknowledge extensive and widely recognized contributions to theoretical computer science over a life-long scientific career.

The Award will be assigned during a ceremony that will take place during ICALP 2021, where the recipient will give an invited presentation during the Award Ceremony.

The following is the list of the previous recipients of the EATCS Awards:

2020 Mihalis Yannakakis
2019 Thomas Henzinger
2018 Noam Nisan
2017 Éva Tardos
2016 Dexter Kozen
2015 Christos Papadimitriou
2014 Gordon Plotkin
2013 Martin Dyer
2012 Moshe Y. Vardi
2011 Boris (Boaz) Trakhtenbrot
2010 Kurt Mehlhorn

2009 Gérard Huet
2008 Leslie G. Valiant
2007 Dana S. Scott
2006 Mike Paterson
2005 Robin Milner
2004 Arto Salomaa
2003 Grzegorz Rozenberg
2002 Maurice Nivat
2001 Corrado Böhm
2000 Richard Karp