John Calabrese

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Education

- **Oxford University** — Oxford, UK
  PhD in Mathematics — *2013*
- **Università di Pisa** — Pisa, Italy
  Laurea Specialistica in Mathematics, 110/110 cum laude — *2009*
  Laurea Triennale in Mathematics, 110/110 cum laude — *2008*

Experience

- **MD Anderson Cancer Center** — Houston, TX
  Research Investigator — *2019 - present*
  - Training in Machine Learning.
  - Designing a Convolutional Neural Network for image segmentation using PyTorch. Code available at: https://github.com/johncalab/pytorchbrats.
- **Rice University** — Houston, TX
  G.C. Evans Instructor of Mathematics and National Science Foundation Research Fellow — *2014 - 2018*
  - Performed mathematical research, both independently and as part of a team, with a focus in Algebraic Geometry.
  - Published research articles in top peer-reviewed academic journals.
  - Professor for several courses, from the undergraduate level to the advanced graduate, including: Linear Algebra, Multivariable Calculus, and Complex Analysis.
  - Lead organizer for the 2017 Texas Algebraic Geometry Symposium.
  - Delivered talks at various conferences and institutions, including: MIT, Columbia, Brown, and the Institute of Advanced Study at Princeton.
  - Organized a weekly Algebraic Geometry Seminar, inviting external speakers and coordinating their visit.
  - Led multiple learning seminars to help foster new research collaborations within the Algebra group.

Awards

- National Science Foundation, Conference Grant. — *2017*
- National Science Foundation, Mathematical Sciences Postdoctoral Research Fellowship. — *2015*
- American Mathematical Society–Simons Foundation, Travel Grant. — *2014*
- Engineering and Physical Sciences Research Council (UK), Doctoral Prize Fellowship. — *2013*

Selected Publications

A proof of the Donaldson–Thomas Crepant Resolution Conjecture (with S. Beentjes, J. Rennemo), *Submitted to Inventiones Mathematicae.*

Solved an open conjecture in Enumerative Geometry, proving a comparison formula between the DT invariants of a (hard Lefschetz) Calabi–Yau 3-orbifold and the corresponding Calabi–Yau 3-fold. The formula allows translation between invariants on the manifold side (which are computationally intractable) and invariants on the stack side (which can be studied via combinatorics).

Derived Equivalent Calabi–Yau 3-folds from cubic 4-folds (with R. Thomas), *Math. Ann. 65 (2016).*

Discovered two new families of derived equivalent manifolds, using Homological Projective Duality. Designed MAGMA code to perform cohomological computations for mutations among exceptional collections of sheaves.

Technical Skills

- Python, LaTeX.
- Familiarity with NumPy, Pandas, Scikit-learn, SciPy, PyTorch, Git, JupyterLab.