To whom it concerns,

Below is a Recommendation letter for Mr Travia.
If you have any question please feel free to contact me.
Dr Mohamed Elhamdadi

I have been Antonino Travia's professor throughout Linear Algebra, Introduction to Topology, and currently for Representation Theory. He earned the highest possible grade in both completed classes. Throughout the years, Tony has brought creativity, passion, and a hard working mentality for mathematics to all of my classes. He also regularly engages in class discussions and attends office hours where we frequently discuss knot theory. He always supports his peers constructively, whether or not they are correct, and works very well with others. I am certain Tony will continue doing great and creative things in his future. He also constantly seeks and appreciates any kind of feedback on his own work.

I highly recommend him as a participant in your program.

Best Regards,
Mohamed Elhamdadi, Ph.D.
Associate Professor
Department of Mathematics
University of South Florida

APPLIED CATEGORY THEORY 2019 SCHOOL

Background Document
ANTONINO TRAVIA

Category Theory Experience.

My experience with category theory comes from my current representation theory (grad level) course and topology 2 (also grad level; which is at my school algebraic topology). We try to do as much as possible in a category theoretic way, which is a nice approach to representation theory in particular as we can create representations of finite groups, lie algebras, or other more exotic associative algebras. Using it in algebraic topology has also helped me a lot as an undergrad in my analysis 2 class with measure theoretic concepts.

Research Background.

As a junior undergraduate mathematics and physics student, I cannot yet list a specific PhD topic, but I do intend to pursue mathematical physics - the projects I'm working on now include spectral properties of quasicrystals generated by substitution rules, the Berezin quantiation procedure, and some varitions of singular braid monoids.

Order of Project Preference.

1. My first choice is to work with Dr. Miriam Backens; I bring background courses and research in quantum mechanics, working with singular braid monoids (which enjoys many applications to anyon braiding in quantum computing), and I feel my background in substitutional dynamics may also be an interesting perspective.

2. My next choice would be working with Dr. Tobias Fritz. I find the notion of partial evaluation very interesting and somewhat related to how I'm trying to create new monoid variations of the singular braid monoid. I'm use to the notion of weaker algebraic structures than groups/rings/etc. as my advisor Dr. Elhamdadi at my university is an expert on quandles - a structure weaker than a group which pairs beautifully with Reidemeister moves. I think I could contribute a knot theoretic perspective to this project.

A Commitment to Come to Oxford.

If I were to be accepted to this exciting program, I would book the flight to Oxford within the same month.

Thank you so very much for the consideration,

Antonino Travia
Mathematics & Physics, BS (2020)
UNIVERSITY OF SOUTH FLORIDA

Antonino Travia

CONTACT INFORMATION	e-mail: atravia@mail.usf.edu phone: +813-321-9981
EDUCATION	BS Mathematics & Physics, University of South Florida Honors College, 2020
EMPLOYMENT	Mathematics Tutor Hillsborough Community College, August 2015-Present
RESEARCH	• Working alongside Professor David Rabson, chair of the Physics Department, to refine standard Fourier-space methods in the spectral analysis of quasicrystals since for aperiodic systems, no alternative to Felix Bloch's Theorem currently exists. Techniques used include wavelet transforms, unitary representations of symmetry groups, coherent states, and quantum Monte Carlo. May 2018-Present • After an independent study course with Professor Razvan Teodorescu in the Mathematics Department entitled *Special Relativity* & *Quantum Mechanics as Deformation Theories*, we continue exploring new avenues of Berezin and geometric quantization via coherent state representations. August 2018-Present
PRESENTATIONS	TEX *Talk: An Introduction to* LATEX, Society of Physics Students Meeting, University of South Florida, October 2018 *Radiation Sensitive Polymeric Nanoparticles* Science Seminar Series, Hillsborough Community College, December 2016 & May 2017 Faculty Meeting Presentation Regarding the results of being a developmental mathematics volunteer for 10 weeks Hillsborough Community College, Summer 2015
PROJECTS	NASA Aerospace Scholar: course on Mars efforts, the ISS and 1-week rover competition Kennedy Space Center, Cape Canaveral, FL, October 2017
HONORS	Aboly Physics Undergraduate Scholarship University of South Florida, 2018 Dr. Dolores Wells Scholarship for Academic Excellence, Hillsborough Community College, 2016 Eagle Scout Member of Pi Mu Epsilon National Mathematics Honor Society
TECHNICAL ACUMEN	Linux/UNIX, Mathematica, Maple, LATEX

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Statement of Interest
ANTONINO TRAVIA

I learnt of this exciting opportunity from following John Baez's blog on mathematical physics topics. My interest in the program, in the most general sense, comes from my passion to study mathematical physics. I plan to attend graduate school to research on topological field theories and deformation quantization; both of these fields largely employ category theory and so this school would have a lasting impact on my career.

In the narrow sense of the present day - I am an undergraduate and I work closely with the 2-3 mathematical/theoretical physicists at my school. Category theory would certainly help in my deformation of singular braid monoids as I am dually looking at deforming their algebraic structure and then creating different types of generators both analytically and with braid diagrams. My other project which involves a Fibonacci substitution rule to generate a 1-dimensional quasicrystal model has spectrum which is extremely hard to characterize where some energies are affiliated with the notion of quantum chaos. We are employing wavelet techniques and coherent state representations - neither of which seem to have been recast in a category-theoretic language - and *both* of which really ought to be!

Fourier analysis has well-known flaws for non-stationary signals or signals with sudden surges. It is a completely frequency-localized theory and yet is the standard method for so many areas of physics. Wavelet transformations enjoy temporal and frequency localization but there is no unified way to write down a wavelet basis for a particular situation and it is my feeling that this is why there use is less widespread. We are trying to classify a family of signals at the moment (generated by a substitution rule) and I'd love to be involved in this school to come up with some novel ideas for such classifications and perhaps try to bring applied category theory to the forefront in classifying such families of signals.

Thank you so very much for the consideration,

Antonino Travia
Mathematics & Physics, BS (2020)
UNIVERSITY OF SOUTH FLORIDA