



# Building Bridges to Diversity: The Fisk-Vanderbilt Masters-to-PhD Bridge Program

*A joint program in astronomy, physics, materials science, and biology.*  
Keivan G. Stassun, Arnold Burger, David Ernst, Kelly Holley-Bockelmann, Donna Webb



Fisk and Vanderbilt are located in Music City USA (Nashville, Tennessee).

## The Bridge Program in Brief

By completing a Masters degree at Fisk under the guidance of caring faculty mentors, students develop the strong academic foundation, research skills, and one-on-one mentoring relationships that will foster a successful transition to the PhD at Vanderbilt. The program is flexible and individualized to the goals and needs of each student. Courses are selected to address gaps in undergraduate preparation, and research experiences are provided that allow students to develop—and to demonstrate—their full scientific talent and potential.

### This program is for:

- Students with undergraduate majors in physics, chemistry, biology, or engineering.
- Students motivated to pursue the Ph.D. but who require additional coursework, training, and/or research experience.

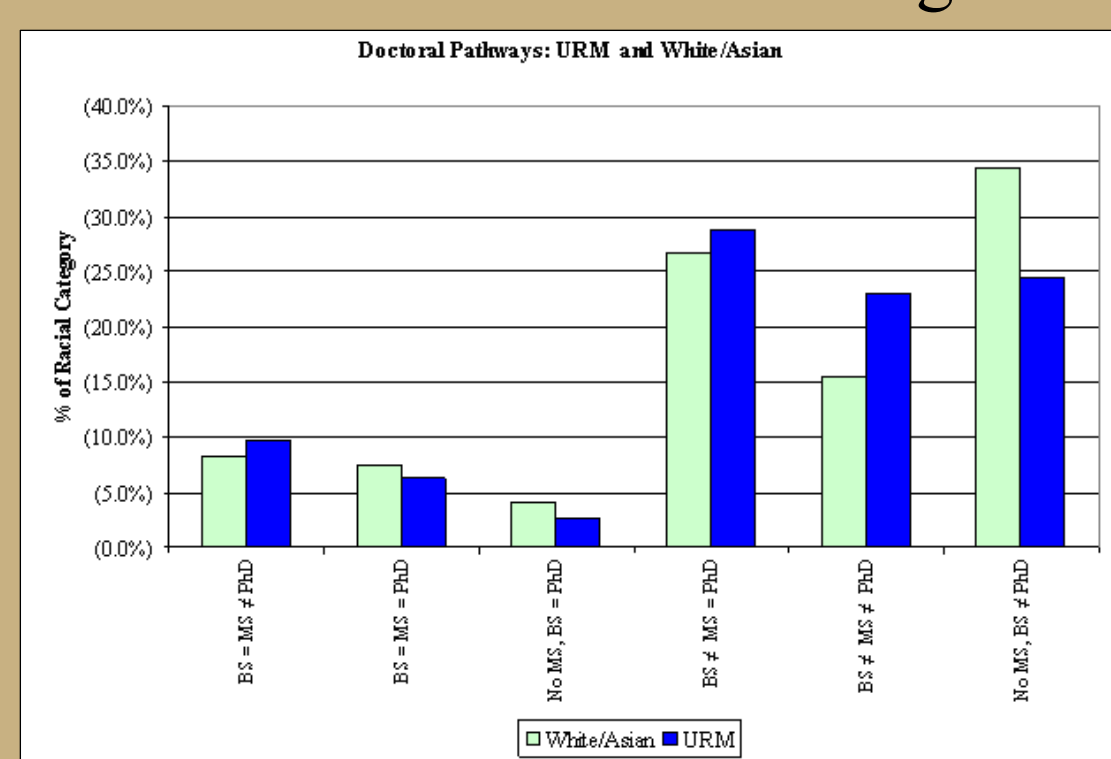
### How the program works, in a nutshell:

- Earn a Masters degree in physics at Fisk, with full funding support.
- Along the way, get valuable research experience with caring, dedicated mentors.
- Get fast-track admission to a participating Vanderbilt PhD program, with full funding.

## The Research Basis for our Approach

### 1. The role of Historically Black Colleges and Universities (HBCUs). HBCUs:

- produce 1/3 of all science baccalaureate degrees earned by African Americans.
- are the Top 10 producers of Black physics degree recipients.
- are the baccalaureate origin for the majority of Black PhD recipients in the sciences.



### 2. The role of the Masters-to-PhD transition.

- Minorities are ~50% more likely to earn an MS degree en route to the PhD (Lange 2006).
- Minorities are more likely to earn the BA, MS, and PhD degrees from three different institutions.

The graph at left shows comparisons between underrepresented minorities (URMs) and White/Asian students, based on different permutations of the educational pathway to the PhD. An equal sign indicates degrees earned from the same institution. The fourth and sixth comparisons from the left show the “traditional” paths to the PhD, in which the student earns the BA degree from institution A, and either receives both the MS degree and the PhD from institution B or else forgoes the MS degree entirely. The fifth comparison from the left is shown the case for earning the BA degree at institution A, a “terminal” MS degree at institution B, and PhD from institution C. Minorities are much more likely to take this latter path than non-minorities. Based on analysis of 80,739 PhDs earned in science fields, 1998 to 2002 (Lange 2006).

## Facilitating a Successful Transition to the PhD

In collaboration with Columbia University’s *Center for Institutional and Social Change*, we have identified the following four key concepts that are critical to the success of the program and that are deliberately put into practice:

- Build research-based partnerships; joint research as engine of institutional collaboration.
- Identify students with unrealized potential; recruit and support “diamonds in the rough”.
- Continually monitor the “second derivative” of student performance; detect problems and intervene with support early.
- Leverage professional networks; connect students with the broader community for mentorship and research opportunity.

In addition, the program includes these key elements to ensure successful student transitions:

Benefit / Requirement	Rationale
Full financial support.	Financial burden should not be an impediment to full participation and satisfactory progress.
Joint advisory committee of both Fisk and Vanderbilt mentors.	Track student progress and ensure student readiness for PhD-level work.
Publication-quality MS thesis through research in both Fisk and Vanderbilt labs.	Develop relationships with faculty who can serve as advisors and advocates.
Course requirements at both Fisk and Vanderbilt.	Demonstrating competency in core courses is essential to showing promise for PhD study.

## Bridge Program Facts & Figures

- In 2006, U.S. institutions awarded to Black U.S. citizens 12 PhDs in physics (out of 637 U.S. citizen PhDs; 1.9%). The average production per PhD-granting institution is 1 minority PhD in biology, physics, materials, and astronomy every 2, 5, 9, and 11 years, respectively.
- Since 2004, the Bridge program has attracted 34 students, 30 of them underrepresented minorities (56% female), with a retention rate of 94%. As of 2006, no institution awards more MS degrees in physics to Black U.S. citizens than Fisk.
- Bridge students have earned top graduate fellowships from NSF (GRF, IGERT, and I<sup>3</sup>) and NASA, as well as Co-op positions (NASA and USAF).
- Extramural grants supporting the Bridge program—support for students, faculty, and related undergraduate training and recruitment—now exceed \$25M.
- Vanderbilt and Fisk provide significant institutional support in the form of tuition waivers, fellowships, and administrative support.

## Bridge Students to Date

Student	Ethnicity/ Gender*	Admit Year	Undergraduate Institution	Discipline	Current Institution / Status
T. LeBlanc	H/M	2004	UMET, Puerto Rico	Astronomy	Vanderbilt (NASA Fellow)
J. Harrison	A/M	2004	Chicago State Univ.	Materials	Case Western (IGERT fellow)
H. Jackson	A/F	2004	Fisk University	Physics	Vanderbilt
J. Rigueur	A/M	2004	Fisk University	Materials	Vanderbilt (IGERT fellow)
V. Alexander	A/M	2005	Florida A&M Univ.	Physics	Vanderbilt
J. Bodnarik	W/F	2005	USAF Academy	Astronomy	Vanderbilt (NASA Co-op)
M. Harrison	A/F	2005	Xavier University	Materials	Vanderbilt (IGERT fellow)
J. Isler	A/F	2005	Norfolk State Univ.	Astronomy	Yale (NSF graduate fellow)
E. Jackson	A/M	2005	Norfolk State Univ.	Materials	Wright State (USAF Co-op)
J. Jones	A/F	2005	Grambling State U.	Materials	Vanderbilt (IGERT fellow)
T. Yan	H/M	2005	UMET, Puerto Rico	Biology	Vanderbilt (GAANN fellow)
L. Zambrano	H/F	2005	UMET, Puerto Rico	Astronomy	Dropped out (now at UTB)
D. Foster	A/M	2006	UMBC	Astronomy	Vanderbilt
A. Ruffin	A/F	2006	Tennessee State U.	Physics	Oak Ridge National Lab
D. Campbell	A/M	2006	Rhodes College	Physics	Vanderbilt (GAANN fellow)
R. Santos	H/M	2006	UMET, Puerto Rico	Physics	Dropped out (status unknown)
E. Walker	A/F	2006	Alabama A&M U.	Materials	Vanderbilt (IGERT fellow)
J. Cooper	A/F	2007	Rust College	Biology	U. Chicago
D. Gunther	W/F	2007	Austin Peay State	Physics	Vanderbilt (I <sup>3</sup> fellow)
L. Palladino	W/F	2007	Hofstra U.	Astronomy	Vanderbilt
C. Mack	A/M	2007	UNC Chapel Hill	Astronomy	Vanderbilt
S. Haynes	A/F	2007	Tennessee State U.	Astronomy	Fisk (MS expected 2010)
E. Morgan	A/F	2007	Tennessee State U.	Astronomy	Fisk (MS expected 2010)
A. Parker	A/M	2007	Austin Peay State	Physics	Fisk (MS expected 2010)
F. Bastien	A/F	2008	U. Maryland	Astronomy	Fisk (MS expected 2010)
F. Colazo	H/M	2008	Fisk University	Astronomy	Fisk (MS expected 2010)
B. Kamai	N/F	2008	U. Hawaii	Astronomy	Fisk (MS expected 2011)
S. Eastmond**	A/M	2008	Fisk University	Materials	Fisk (MS expected 2010)
J. Harris	A/F	2008	Grambling State U.	Astronomy	Fisk (MS expected 2010)
M. Richardson	A/M	2008	Fisk University	Astronomy	Fisk (MS expected 2010)
D. Sanchez	H/F	2008	UMET, Puerto Rico	Physics	Fisk (MS expected 2010)
L. Jean	H/F	2008	U. New Hampshire	Biology	Fisk (MS expected 2010)
B. Cogswell	A/F	2009	Florida State U.	Physics	Fisk (MS expected 2011)
M. Williams	A/M	2009	Morehouse College	Astronomy	Fisk (MS expected 2011)

\*Ethnicity/Gender: H=Hispanic, A=African American, N=Native Hawaiian, W=White, F=Female, M=Male. \*\*International student.

