Fisk-Vanderbilt Master’s to PhD Bridge Program

David Ernst
Vanderbilt University
Fisk University

AAPT, August, 20102
Fisk/Vanderbilt Bridge Program

- Keivan Stassun, Vanderbilt/Fisk, co-Director (astro)*
- Arnold Burger, Fisk/Vanderbilt, co-Director (materials)*
- David Ernst, Vanderbilt/Fisk (nucl/part)*
- Kelly Holley-Bockelman, Vanderbilt/Fisk (astro)
- Donna Webb, Vanderbilt, (biology)
- David Cliffel, Chemistry, Vanderbilt
- Lee Limbird, Biology, Fisk
- Steve Morgan, Physics, Fisk
- Natalie Arnett, Chemistry, Fisk/Vanderbilt
- Brian Nelms, Biology, Fisk/Vanderbilt
- Patrick Martin, Biology, Fisk/Vanderbilt

Plus many faculty who supervise Masters and PhD dissertations
Some advantages

★ Schools are 1.5 miles apart
★ Direct bus connection between them
★ Great history of working together, existing positive relationships
★ Already had agreement that students at either school may take classes at the other school
★ Physics at Fisk is their strongest department, has funded research in materials
★ Fisk has strong Masters program
★ Fisk students have access to Vanderbilt library
★ No parking problems at Fisk
Things we added first year - 2006

★ Parking at Vanderbilt for $10 semester in faculty lot for students whose home is Fisk
★ Vanderbilt provides free bus passes to employees and students
★ NSF IGERT in Interdisciplinary Materials Science, includes 2 students/year supported for Masters at Fisk
★ MUCERPI Grant from NASA
Get the preparation you need to earn a PhD

1. Earn a Masters degree in physics or biology at Fisk, with full funding support.
2. Get valuable, paid research experience.
3. Receive preparation for the GRE.
4. Get fast-track admission to the Vanderbilt PhD program, with full funding support.

- Physics & Astronomy
- Biology
- Biomedical sciences
- Materials science
Masters-to-PhD Bridge Program

Recruiting:

❖ Meetings – booth at Annual NSBP/NSHP meeting and SACNAS
  - Become a part of the meeting – organize sessions, get your faculty invited talks, participate in outreach, etc.
  - Be there every year
  - Judge posters
  - Introduce yourself to students

❖ Become a part of the minority physics community, join NSBP and/or NSHP and volunteer, get involved

❖ Example, me – Past-President and co-Founder of NSHP, Chair of the Conference Committee of the Joint Annual Conference of NSBP/NSHP, co-Chair of the Division of Nuclear/Particle Physics Division of NSBP, Fellow of NSBP, co-founder and chair AIP Liaison Committee for Under-represented Minorities; member AAPM Subcommittee on Minority Recruitment

❖ Be pro-active, go out and find the students
Masters-to-PhD Bridge Program

Admitting:

- Realize grades and GRE’s are limited information
- Realize you are not looking for perfect on paper student if you wish to expand the pool
- Looking for “unrealized potential”
### Identifying Unrealized Potential: Emerging Practice

#### What roles are we looking for?

- Students with commitment and academic potential
- Productive, creative, entrepreneurial researchers
- Effective teachers and mentors
- Transformational leadership?

#### What qualities predict success?

- Passion
- Initiative, “fire in the belly”
- Hard work
- Success in relevant courses
- Persistence in the face of hardship

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A critical next step: Tracking and systematizing Bridge Program selection practices
Retention: Mentoring

★ Key to retention

★ Multi-dimensional

★ Personal, academic, research, support, critical, etc.

★ Teach students about and help them build

★ 5 faculty: Fisk/Vanderbilt (Burger, Collins), Vanderbilt/Fisk (Stassun, Ernst, Holley-Bockelmen)

★ Staff: Vanderbilt (Alyce Dobyns), Fisk (Consti Coca)

★ Just hired a PhD Executive Director
Monitor:

- Goal 2^{nd} order derivative
- Formal meetings three times/year
- Casual conversations, take a student to lunch, give them a ride to Fisk,
- Formal role for students in program (social organizers, student participation in Friday lunches, organizing senior student mentors)
Transition points:

- Entry
- Fisk to Vanderbilt, Masters to PhD (almost seamless, but do require formal admission by Vanderbilt Program Committee)
- Course work to research
- Finishing Dissertation
Leveraging Social and Professional Networks

- Bridge Program faculty leverage their networks to link students to opportunities
  - Cultivate multiple relationships
  - Identify research and fellowship opportunities
  - Vouch for students in a highly credible way

- This faculty support helps to broaden students’ networks and social capital

- Connect to other collaborations, professional networks and associations to broaden Bridge Program impact
Masters-to-PhD Bridge Program

Programmatic requirements and benefits:

✧ Joint advising committees: Involvement of potential PhD advisors from the start, enhanced communication and tracking of progress

✧ Requirement of coursework at Vanderbilt: Become known to Vanderbilt faculty, complete PhD requirements
  – Masters degree requirements: Classical Mechanics, Quantum Mechanics I, Electricity and Magnetism I, Statistical Mechanics, Electives
  – PhD degree requirements: Above, plus E&M II and Quantum II (physics) or Stars, Galaxies, Radiative Processes (astronomy), Electives

✧ Requirement of research at Vanderbilt: Demonstrate ability in the lab, develop faculty advocates
  – Areas of joint Vanderbilt/Fisk research: Observational astronomy, computational astrophysics, detector development (“astro-materials”)

✧ “Professionalization”: Seminar on academic culture, participate in professional meetings, “Bridge Club”

Note: Not a “back door”: Must satisfy same PhD requirements as all PhD students.
Critical Challenges

- Building insights, knowledge and practices into departmental architecture
- Strengthening and supporting mentoring relationships
  - Faculty
  - Peers
- Navigating traditional and innovative conceptions of merit
- Developing success metrics that track institution- and profession-level change
# Metrics of success: Money

## Table 2: Funding Received to Date Supporting Bridge Students and Faculty

<table>
<thead>
<tr>
<th>Agency</th>
<th>Program</th>
<th>Years</th>
<th>Lead Faculty (PI in boldface)</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSF</td>
<td>CAREER</td>
<td>2004-09</td>
<td>K. Stassun (Vanderbilt)</td>
<td>$1M</td>
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<tr>
<td>NASA</td>
<td>MUCERPI</td>
<td>2004-07</td>
<td>A. Burger (Fisk), E. Collins (Fisk), D. Ernst (Vanderbilt), S. Morgan (Fisk), K. Stassun (Vanderbilt)</td>
<td>$800K</td>
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<tr>
<td>NSF</td>
<td>CREST/Materials Sci.</td>
<td>2004-14</td>
<td>E. Collins (Fisk), A. Burger (Fisk), W. Lu (Fisk), S. Morgan (Fisk), R. Mu (Fisk)</td>
<td>$9.4M</td>
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<tr>
<td>DoE, DHS, DoD, NASA</td>
<td>Materials Science</td>
<td>2004-09</td>
<td>A. Burger (Fisk)</td>
<td>$3.5M</td>
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<tr>
<td>NSF</td>
<td>RBU</td>
<td>2004-10</td>
<td>E. Collins (Fisk), A. Burger (Fisk), S. Morgan (Fisk)</td>
<td>$600K</td>
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<td>NSF</td>
<td>RBU</td>
<td>2007-10</td>
<td>D. Ernst (Vanderbilt), K. Stassun (Vanderbilt)</td>
<td>$300K</td>
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<td>NSF</td>
<td>PAARE</td>
<td>2008-13</td>
<td>K. Stassun (Vanderbilt), A. Burger (Fisk), K. Holley-Bockelmann (Vanderbilt), M. Watson (Fisk)</td>
<td>$2.2M</td>
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<td>NSF</td>
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<td>2009-14</td>
<td>K. Holley-Bockelmann (Vanderbilt)</td>
<td>$1.1M</td>
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<tr>
<td>NSF</td>
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<td>2009-14</td>
<td>K. Stassun (Vanderbilt)</td>
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<td>Vanderbilt Provost</td>
<td>VIDA</td>
<td>2007-16</td>
<td>K. Stassun (Vanderbilt)</td>
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<td>Vanderbilt A&amp;S Dean</td>
<td>Biological Sciences</td>
<td>2008-11</td>
<td>D. Webb (Vanderbilt), J. Ike (Fisk), K. Stassun (Vanderbilt)</td>
<td>$150K</td>
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<td>Fisk Provost</td>
<td>Physics/Biology</td>
<td>2004-14</td>
<td>E. Collins (Fisk), S. Morgan (Fisk), J. Ike (Fisk)</td>
<td>$937K</td>
</tr>
</tbody>
</table>

$30.1M
**Metrics of success: Human capital**

**Since 2005:**
- 61 Bridge students
- 53 Underrepresented minorities (all US citizens)
- 59% female
- 92% retention rate

**Since 2006:**
Fisk is top producer of Black MA degrees in physics

**In 2012:**
Vanderbilt becomes top producer of minority PhDs in physics, astronomy, materials science.
Graduated:

- 4 Vanderbilt PhD’s
- 3 Materials Science (2 African-American males, 1 African-American female)
- 1 Physics/astronomy (Hispanic African-American male)
- 3 more scheduled to finish this fall (2 African-American females, 1 white female)
Metrics of Success: Human Capital
Expansion

Have expanded into chemistry (3 students) and biology (5 students)
Have funded joint program with Delaware State

Si tu puedes!!!