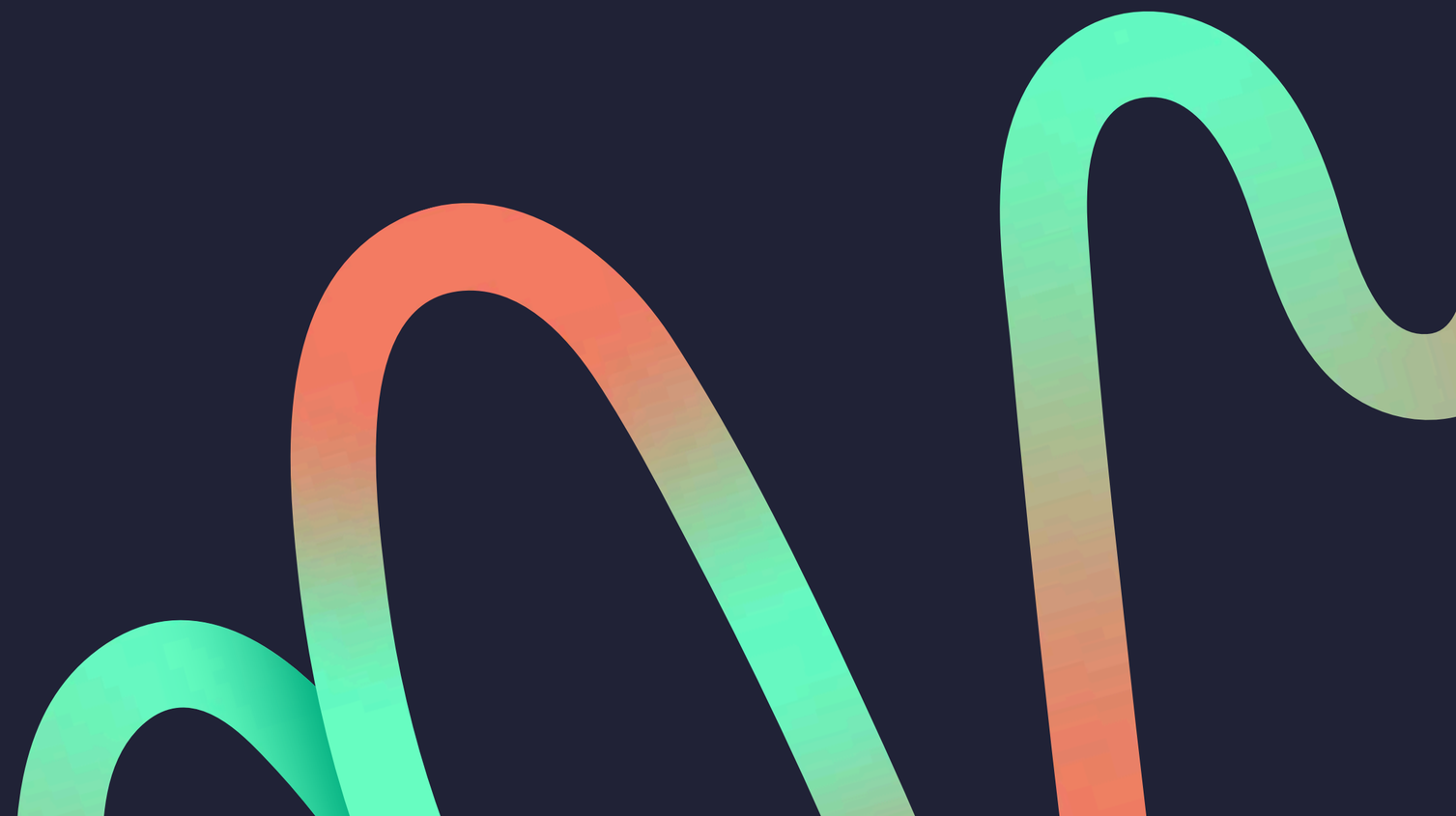
PERCEPTIONS OF PHYSICS AND PHYSICISTS IN UK HIGHER EDUCATION

Lauren Muir,
Nicolas Labrosse, Peter Sneddon
University of Glasgow

APE Anniversary Celebration



Introduction

- Despite ongoing efforts, representation of traditionally under-represented groups remains a problem in the physical sciences [1]

- Previous research has highlighted that persistence in science can be linked to self-to-prototype matching [2], i.e. whether a student's self image matches their perceived idea of what a physicist is

What makes a physicist?

And how might our answers influence physics identity development?

CoPs and Legitimised Practices

- A *community of practice* (CoP) is a group of individuals with shared resources and knowledge base, working towards a common goal [3]

- *Legitimised practices* are the activities an individual can engage in that brings them closer to being central members of a CoP [4]
    - In this context, legitimate physics practices permit movement towards central membership of the community of practicing physicists, therefore forming a *physics identity*

Measuring Physics Identity

Physics Identity

An individual's concept of themselves as a 'physics person' [5].
Factors include:

- *Interest* in physics
- Strong *competence / performance* in physics
- *Recognition* from others as 'physics person'

Identity Trajectories

In the CoP framework, identity is understood as the trajectory towards / away from membership of the CoP through engagement in legitimised practices. Trajectories may be:

- *Inbound*
- *Outbound*
- *Peripheral*

Research Questions

- What are the legitimised practices of the physics community?
- Are perceptions of legitimised practices different at different career stages, or for different demographic groups?
- Is there a relationship between what someone believes are legitimate physics practices and ability to form and maintain a strong inbound physics identity?

Methodology

Qualitative Study: Interviews	Quantitative Study: Survey
• Interviews with 25 staff / PGRs in School of Physics and Astronomy at the University of Glasgow • Sample included PhD students, R&T staff, technical staff, and teaching support staff	• Addresses a key theme from interview data – perceptions of what it means to be a physicist varied widely across a single population • Extremely wide sample – participants include UG, PGT, and PGR students, as well as R&T, technical, and support staff

Preliminary Results

Most Important Legitimised Practices

- Asking questions
- Engaging in problem solving
- Being curious about physical phenomena
- Having an appreciation and deep interest in physics

Verification of New Physics Identity Instrument

- Principal component analysis on identity measure statements revealed 4 underlying factors:
  a. Recognised as member of physics community
  b. Intrinsic desire to engage in legitimised practice
  c. Confidence in physics concepts
  d. Practical engagement with physics

Demographic Differences in Physics Identity

- Overall physics identity is lower for women than men amongst staff, but not students ($p<0.01$)
- Only factor A (recognised as member of physics community) is lower for women than men for students ($p<0.001$)

References

1. Institute of Physics. ‘Students in UK Physics Departments’, April 2020.
2. Hannover, B., & Kessels, U. (2004). Self-to-prototype matching as a strategy for making academic choices. Why high school students do not like math and science. Learning and Instruction, 14(1), 51–67.
3. Wenger, Etienne. 1998. ‘Communities of Practice: Learning, Meaning, and Identity’. Higher Education from Cambridge University Press.
4. Lave, Jean, and Etienne Wenger. ‘Situated Learning: Legitimate Peripheral Participation’. Higher Education from Cambridge University Press. Cambridge University Press, 27 September 1991.
5. Hazari, Zahra, Gerhard Sonnert, Philip M. Sadler, and Marie-Claire Shanahan. 2010. ‘Connecting High School Physics Experiences, Outcome Expectations, Physics Identity, and Physics Career Choice: A Gender Study’. Journal of Research in Science Teaching 47(8):978–1003.