

Phenomenology: Not just a long word

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What is phenomenology?

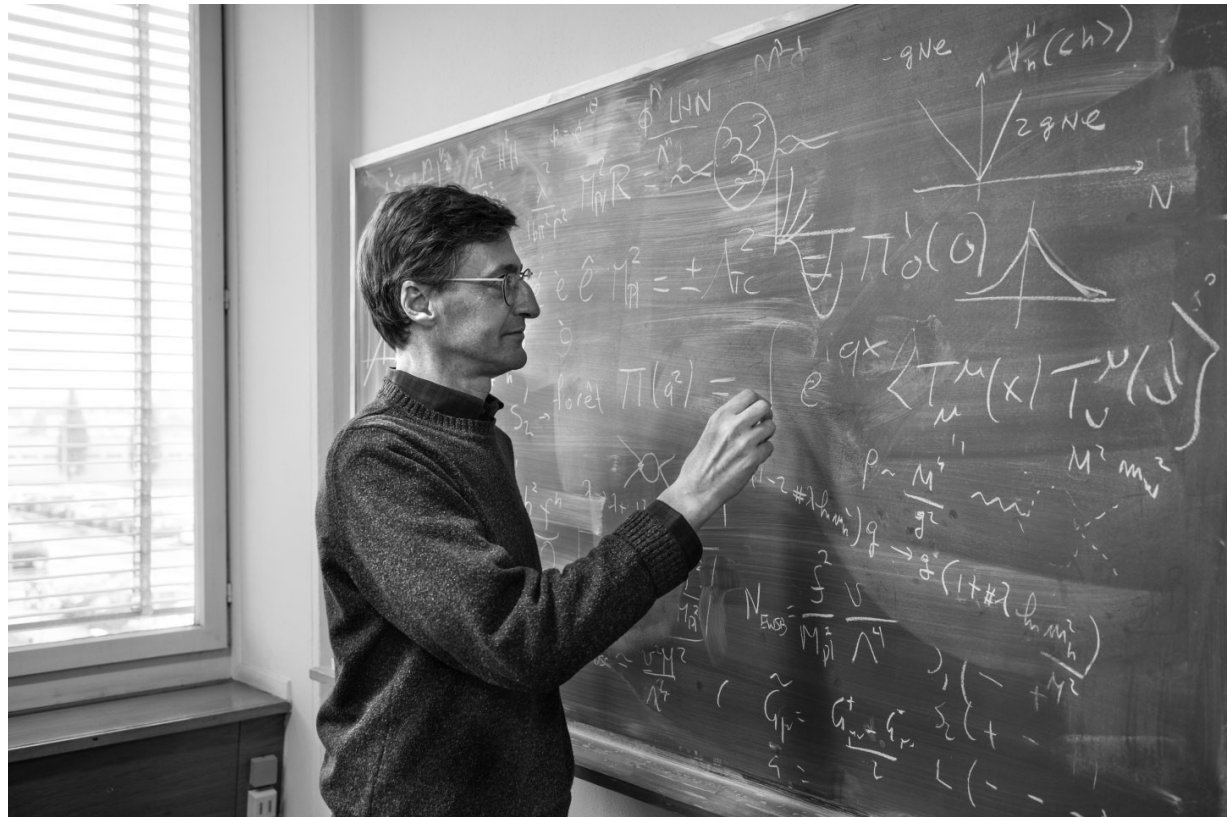
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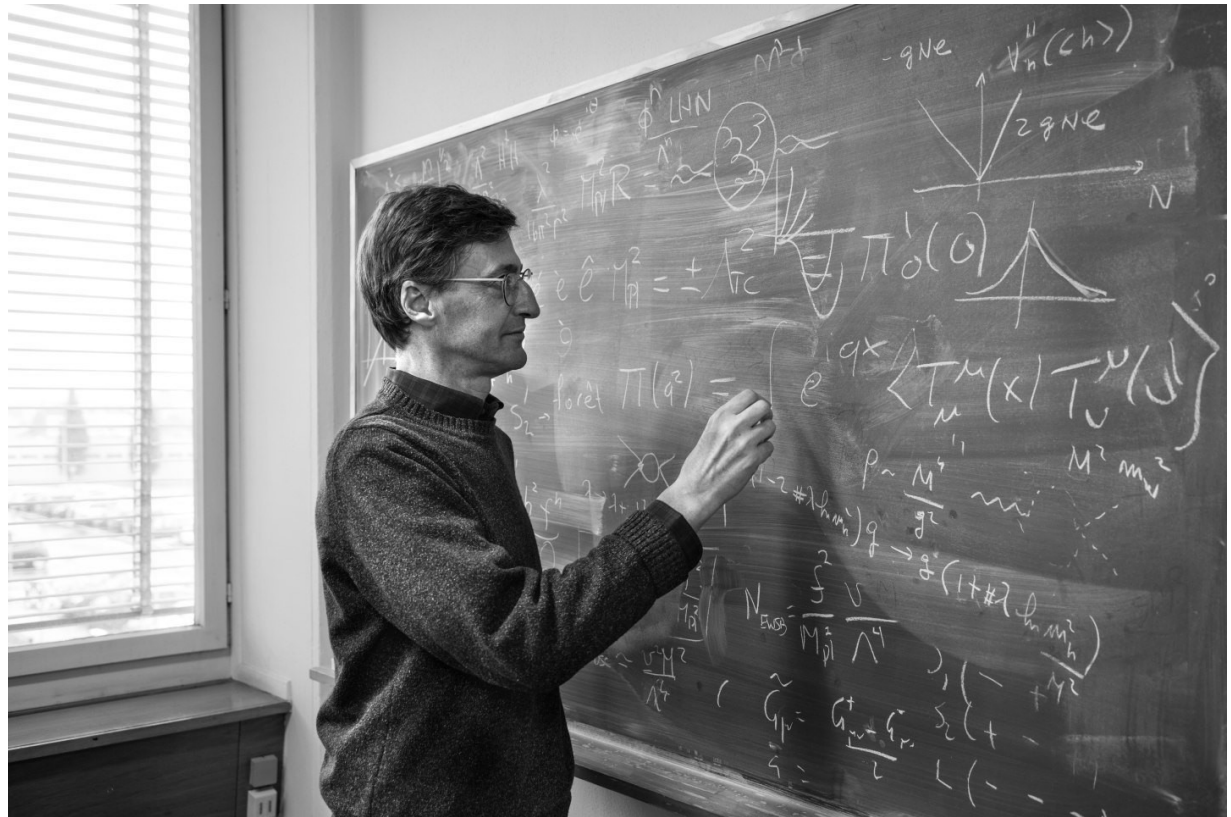
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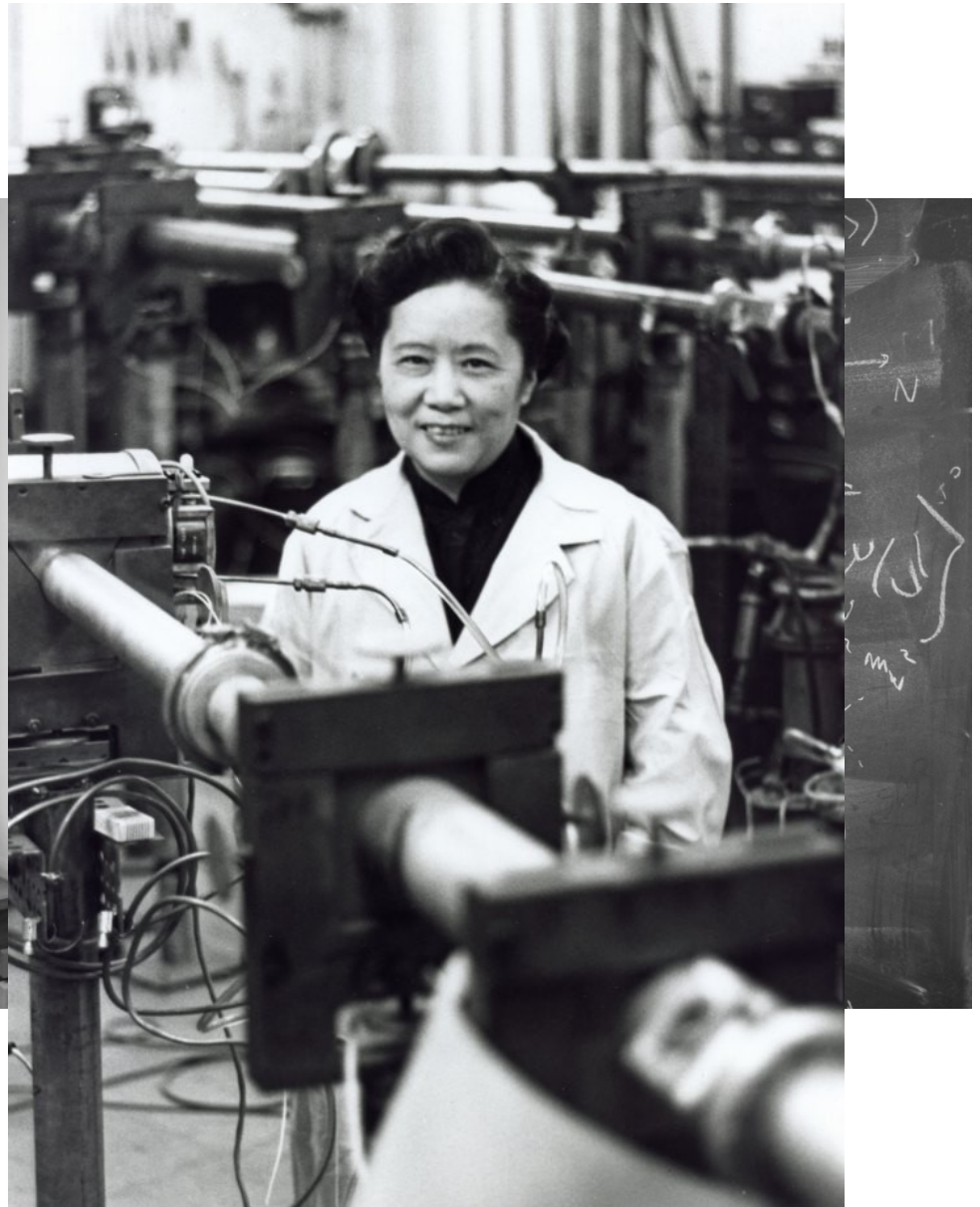
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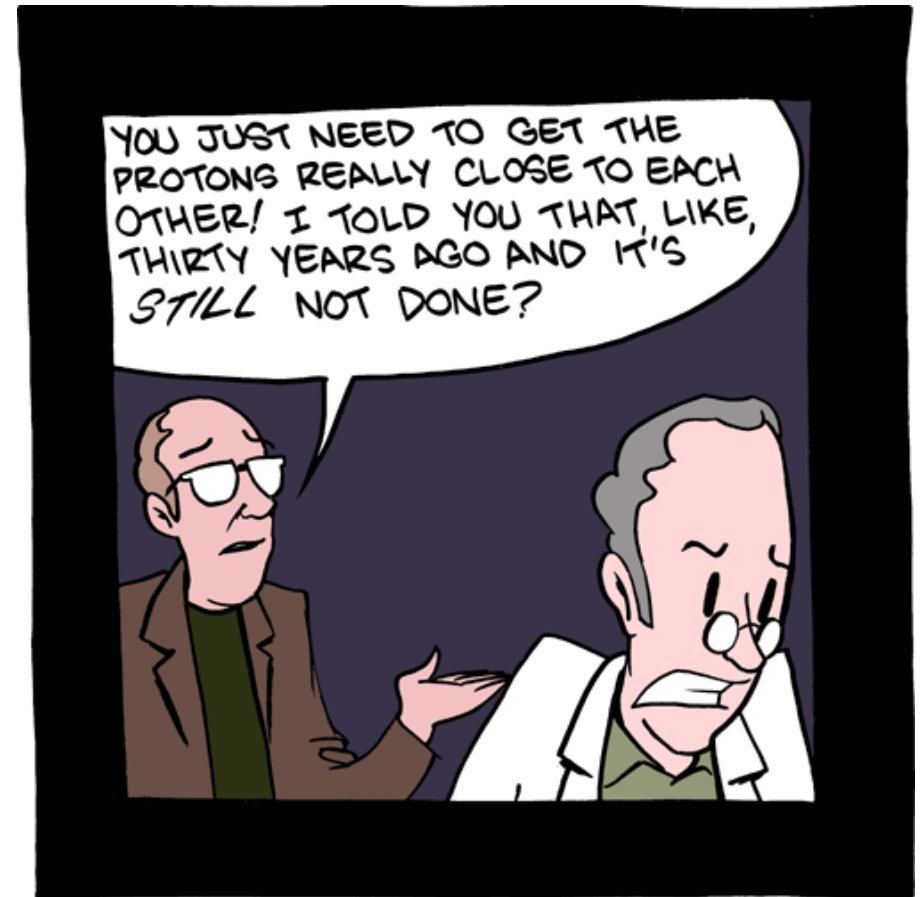


What is phenomenology?

- Really (as you might guess) it's a bit more complicated

What does it mean to be a theoretical physicist?

- Coming up with an underlying description or model of how the world works
- "A theory of everything"



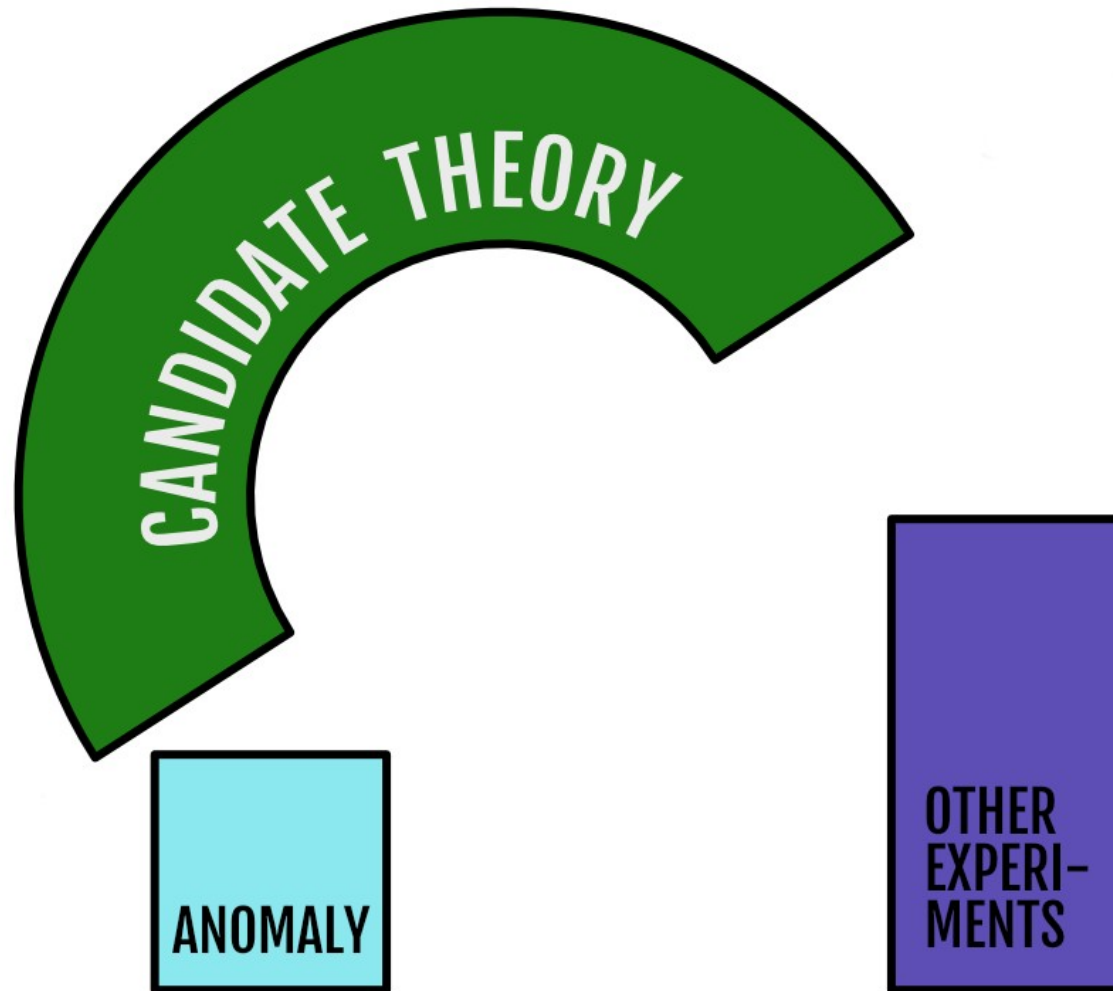
This is why experimental scientists hate theoretical scientists.

What does it mean to be a phenomenologist?

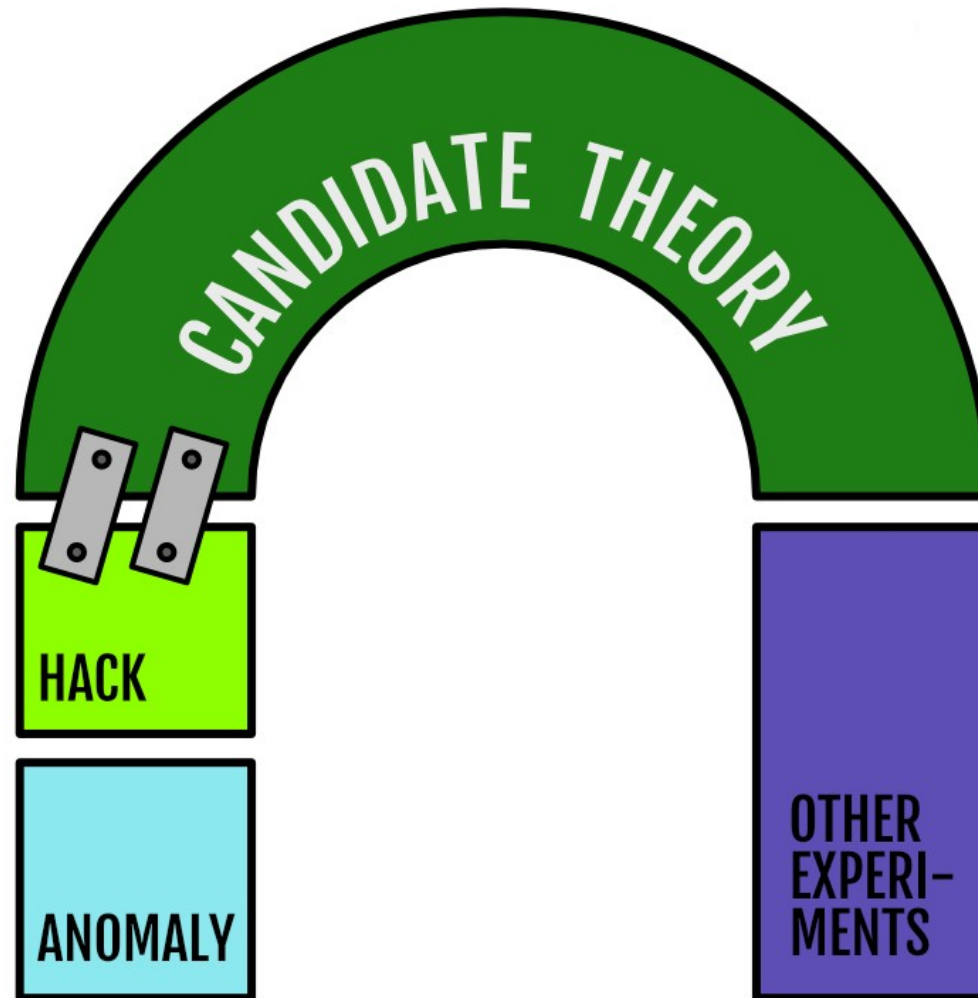
- Phenomenology is somewhere half way
- Still not getting our hands dirty
- But we care about (**good**) ways to test our models – what can be measured, what can't, etc ...
- And being fine with just having a model – a theory of **more things than before** is just fine

Model building

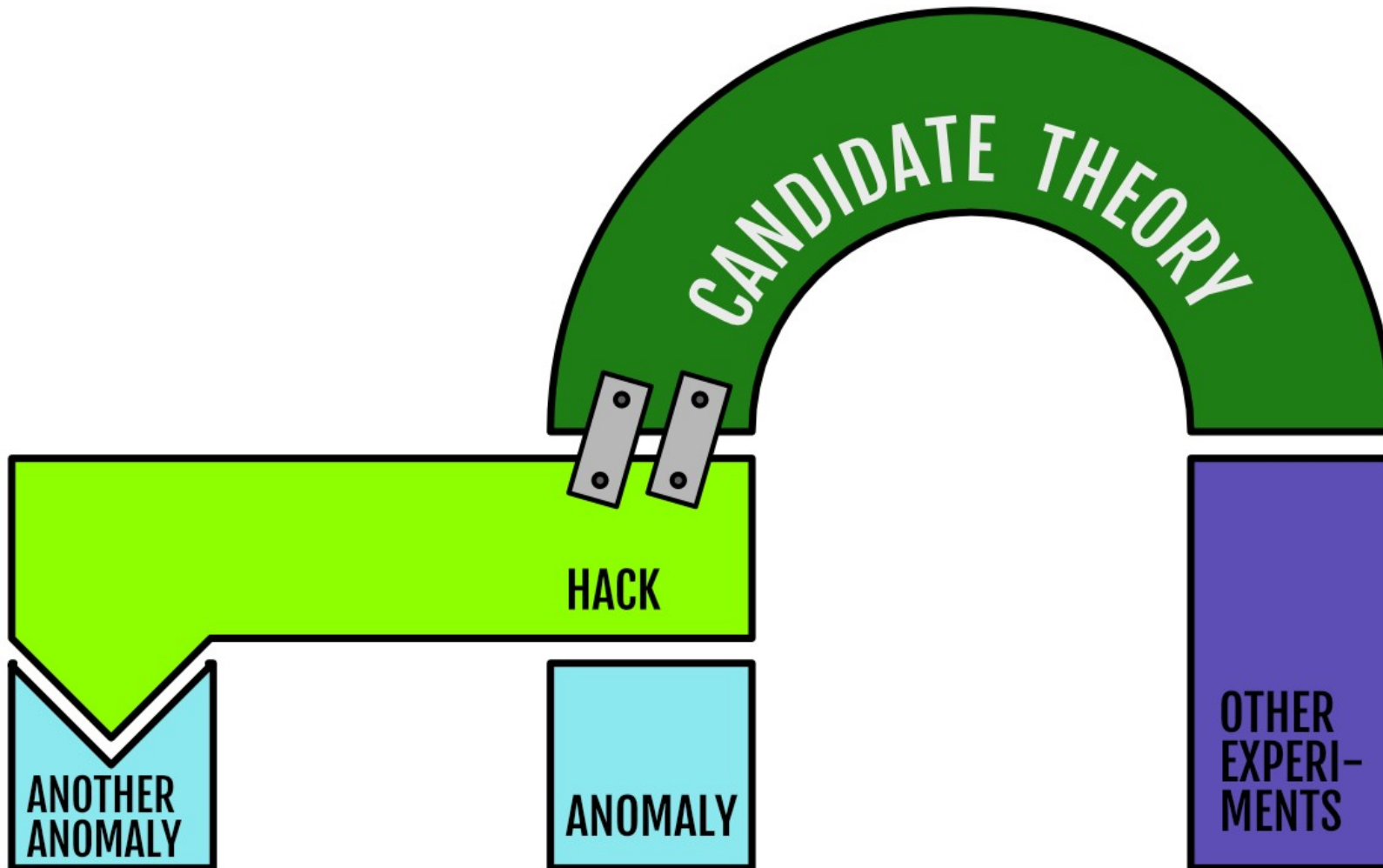
Model building



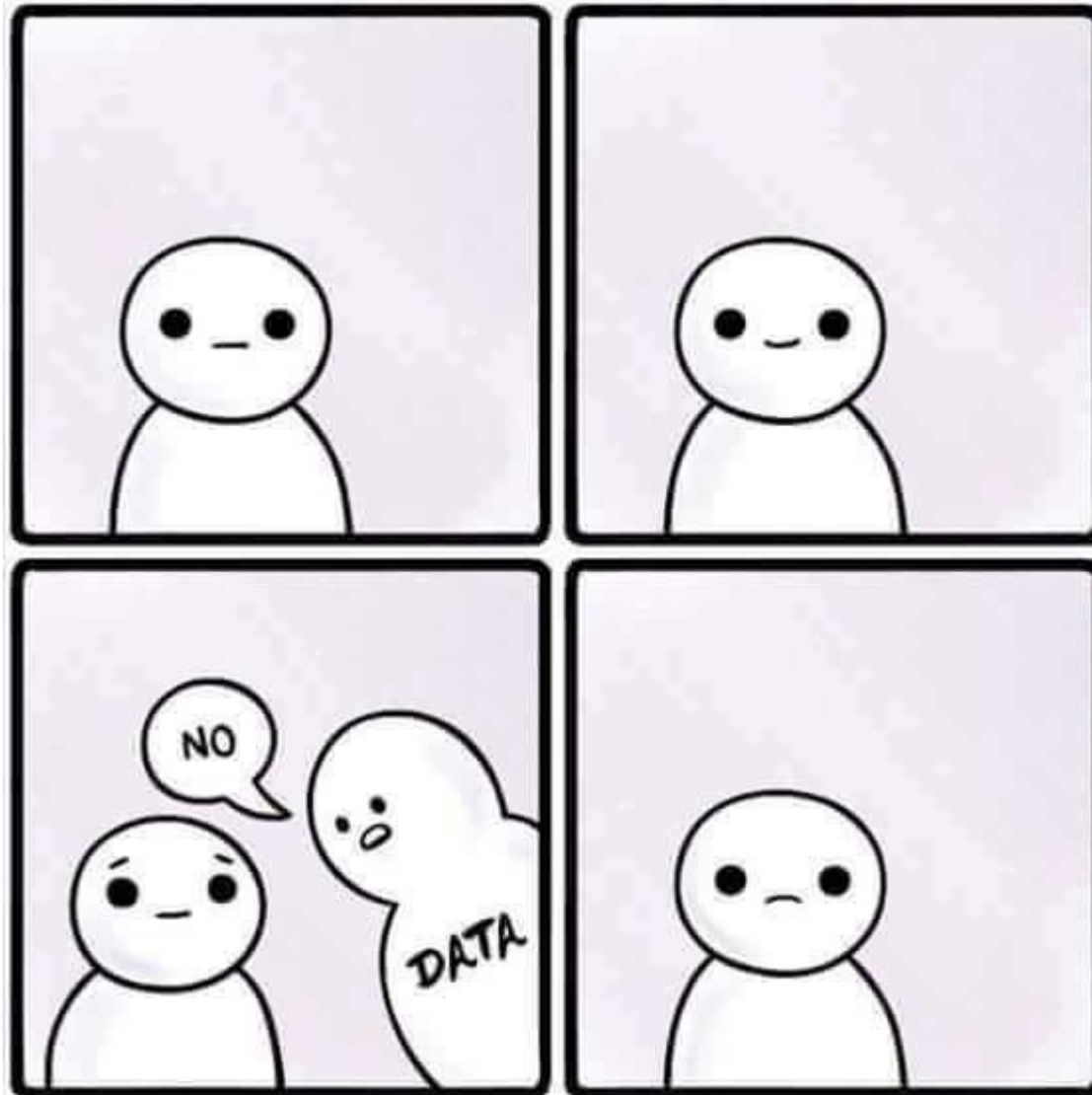
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MODELLING THE INVISIBLE

Computational modelling

- In order to test our theories, we need to know what nice measurable things they predict (this is the essence of phenomenology)
- But our current models only predict probabilities of certain things happening
- And the things we are predicting don't get directly measured – they don't exist for long enough

Hands on – The Galton Board

- The Galton board exhibit shows a similar problem: As the steel balls roll down, they scatter off the needles and a hidden shape, but just from looking at the collection bins, it is hard to work out the shape directly.
- What can be done, however, is to simulate the board with different hidden shapes and compare the outcome...

Thanks!

(please enjoy this joke)

A theorist and an experimentalist are having coffee. The theorist is really excited, she tells the experimentalist, "I've got it—it's a model that's elegant, explains everything, and it's completely predictive." The experimentalist listens to her colleague's idea and realizes how to test those predictions. She writes several grant applications, hires a team of postdocs and graduate students, trains them, and builds the new experiment. After years of design, labour, and testing, the machine is ready to take data. They run for several months, and the experimentalist pores over the results.

The experimentalist knocks on the theorist's door the next day and says, "I'm sorry—the experiment doesn't find what you were predicting. The theory is dead."

The theorist frowns a bit: "What a shame. Did you know I spent three whole weeks of my life writing that paper?"