

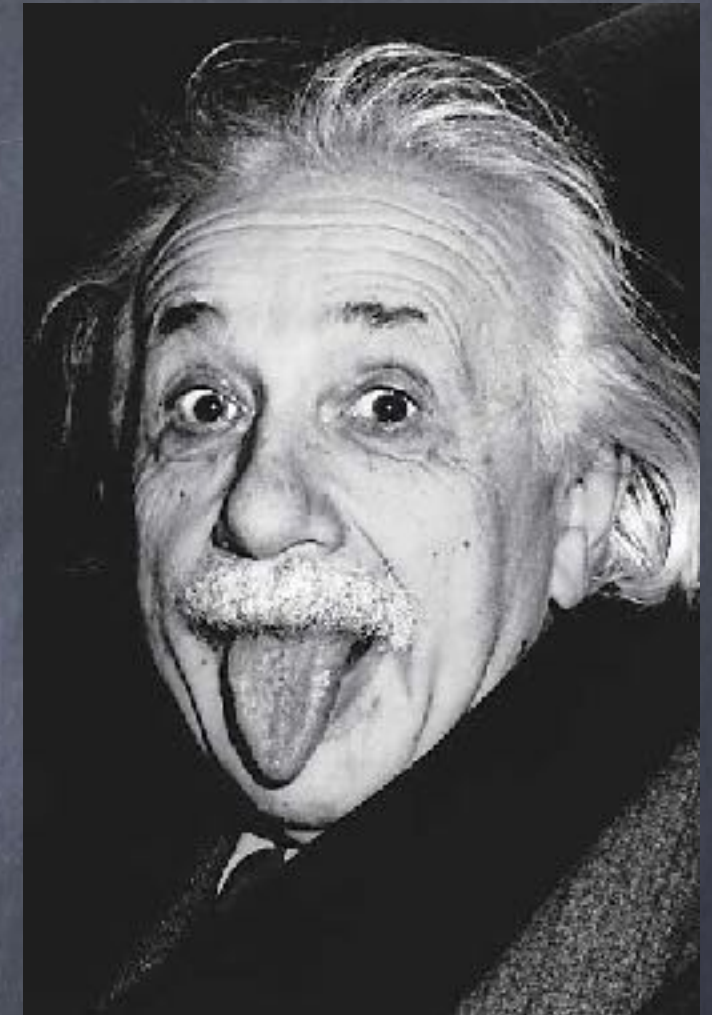
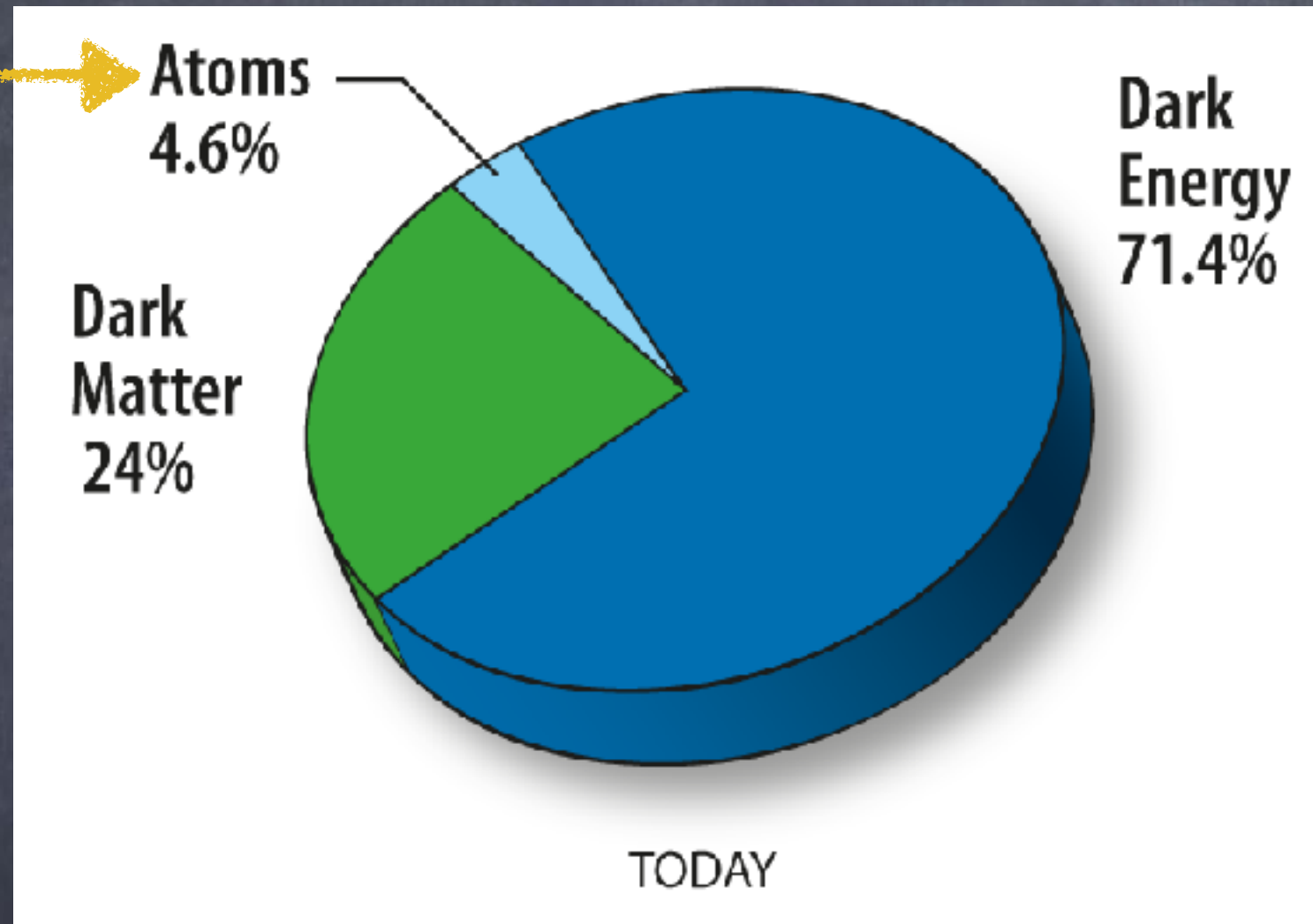
Research in Natural Sciences

Digvijay Wadekar



Composition of the Universe

All
we
know!

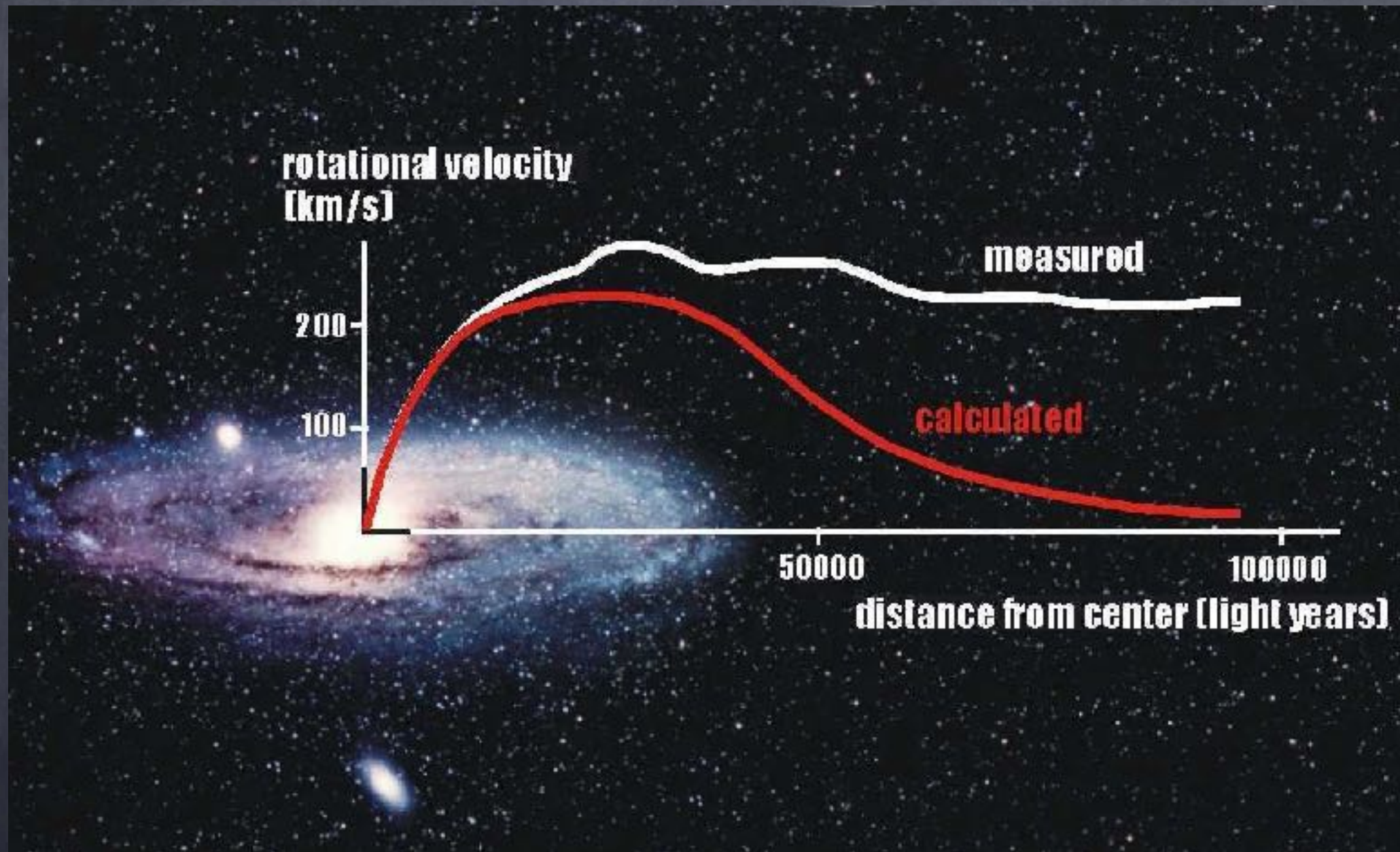


- Will this % will increase/decrease in the future? :p

Dark Matter

- Dark matter is a hypothetical kind of matter that cannot be “directly observed” but accounts for most of the matter in the Universe.
- It is different from ordinary matter in terms that it interacts only through gravitational force and it isn't affected by electromagnetic force(light).

The need for dark matter



**THERE IS A MYSTERIOUS AND POWERFUL FORCE THAT
HOLDS THE UNIVERSE TOGETHER, AND THAT FORCE IS LOVE**



JUST KIDDING - IT'S DARK MATTER

We owe our existence to dark matter





Barry C. Barish (Caltech)



Kip S. Thorne (Caltech)



Rainer Weiss (MIT)



2017 Nobel Prize in Physics

for LIGO

(Laser Interferometric gravitation wave
observatory)



Barry C. Barish (Caltech)



Kip S. Thorne (Caltech)

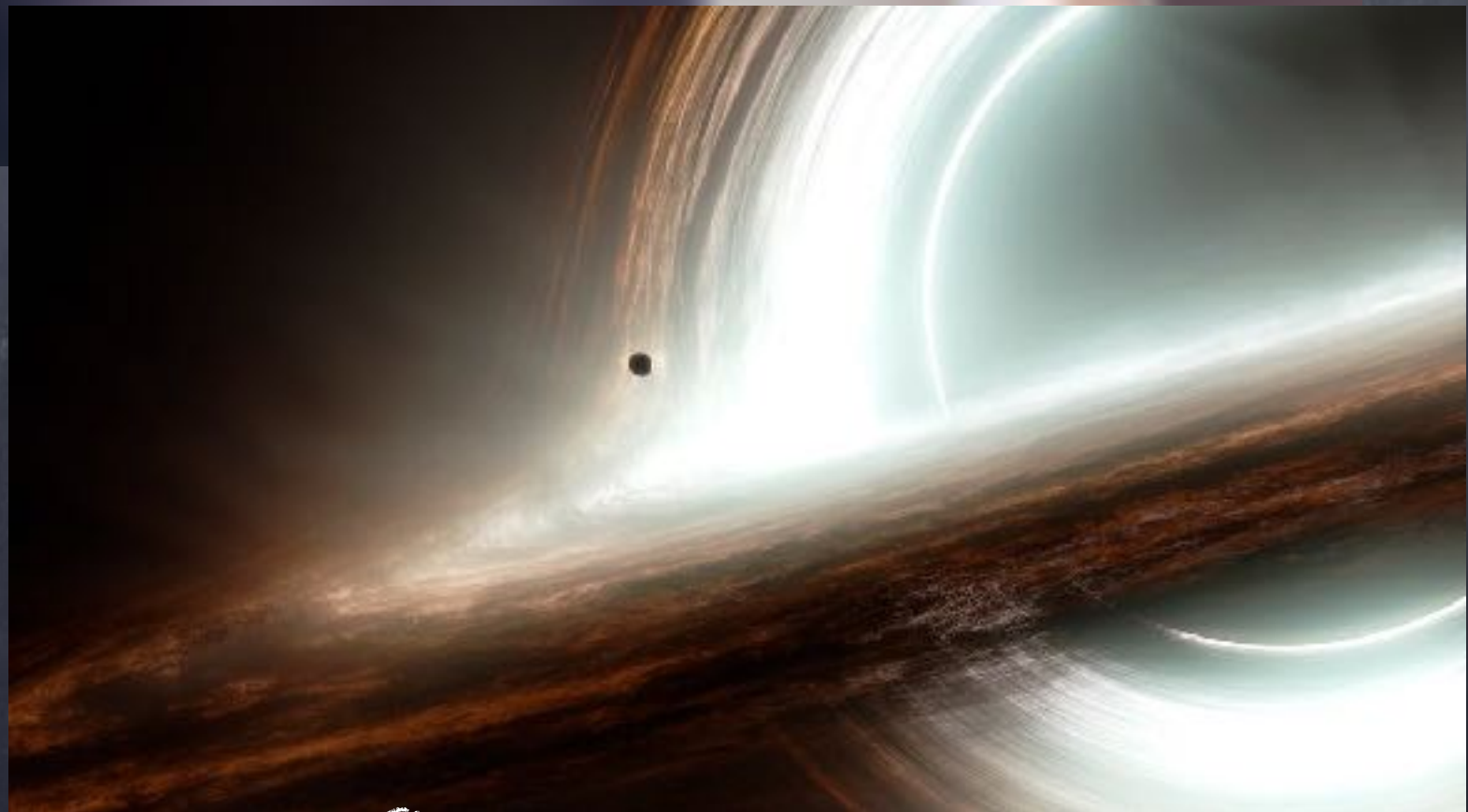


Rainer Weiss (MIT)



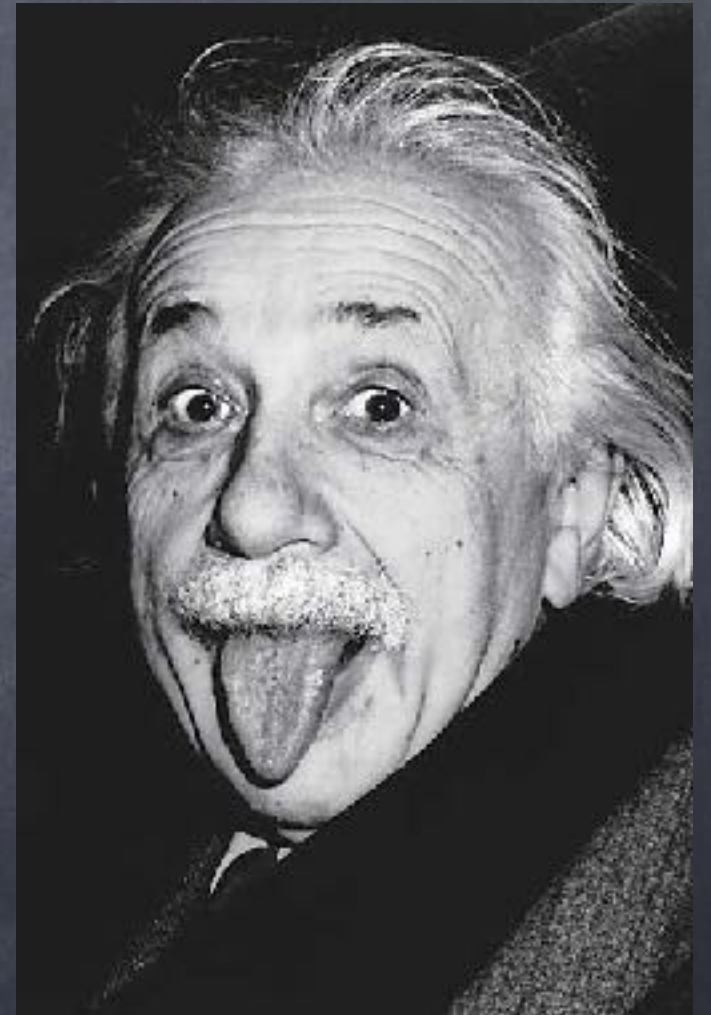
2017 Nobel Prize in Physics for LIGO

His group simulated
Gargantua
shown in interstellar



LIGO

- Einstein proposed the General Theory of Relativity in 1916 which predicted gravitational waves.
- It took 100 years for the first detection of G-Waves by the LIGO experiment.



JUST
IN

3

🕒 24mins Clashes break
out near South Sudan
capital in truce violation

4

🕒 26mins Morgan Stanley
to take \$1.25 bln hit in Q4
from tax bill

5

🕒 51mins It is
responsibility
world: RSS ch

MENU



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SCI-TECH > SCIENCE

SCIENCE

First LIGO lab outside U.S. may come up in Maharashtra's Hingoli

THE TIMES OF INDIA
CITY



City

Chennai

Citizen Reporter

Crime

Civic Issues

Politics

Schools & Colleges

Events

Weather

News » City News » Chennai News » LIGO lab to come up in Maha by 2020

LIGO lab to come up in Maha by 2020

Video 1. Space time fabric

Video 2. Binary black hole merger

LIGO



3. LIGO working

Q: Where does gold in the universe come from?



Q: Where does gold in the universe
come from?

A: Binary Neutron Star Merger



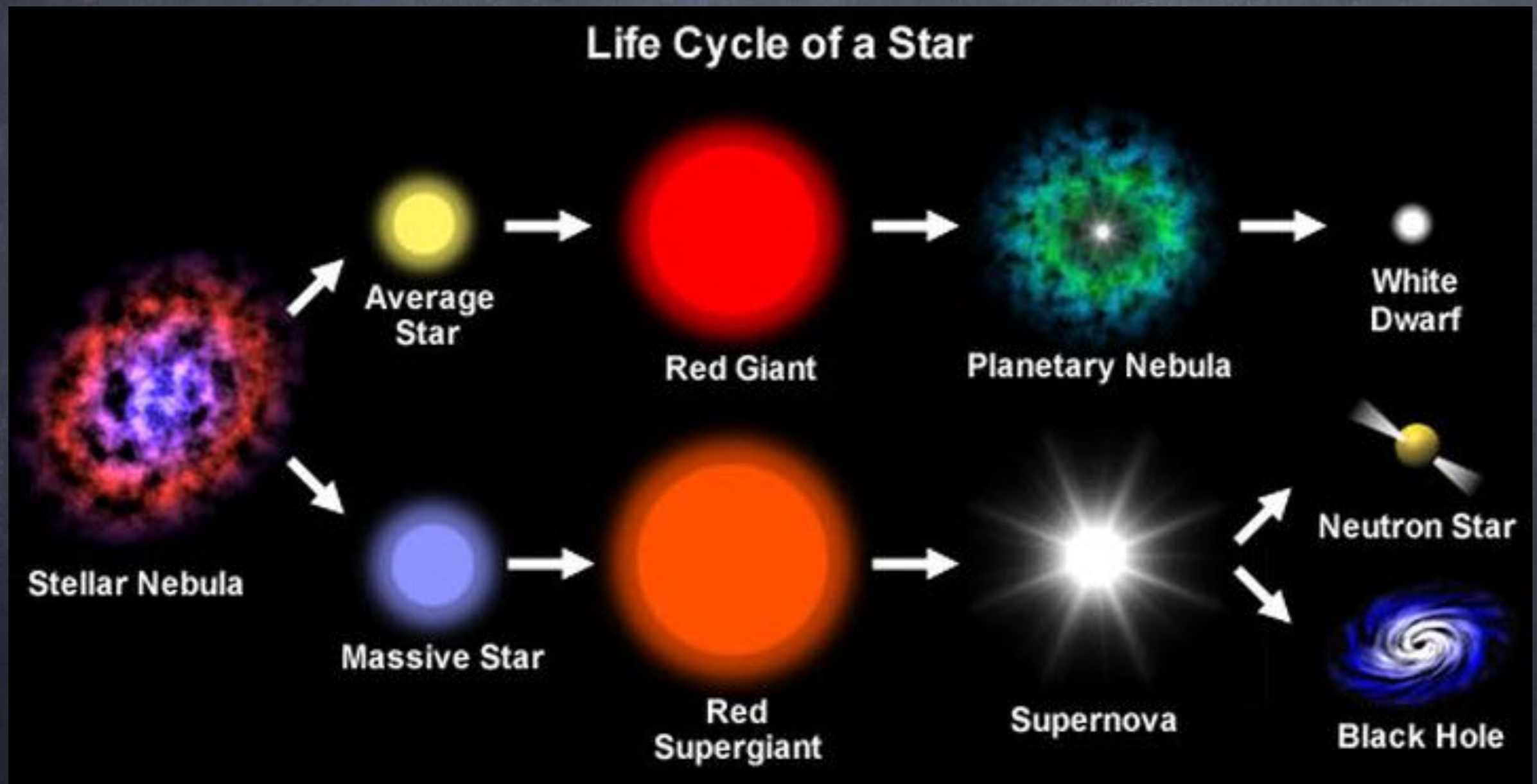
BUSINESS INSIDER
INDIA

[Home](#) > [Tech](#) > Astronomers Detected 100 Earths' Worth Of Gold Being Forged In Space - Here's How Much It's Worth

Astronomers detected 100 Earths' worth of gold being forged in space - here's how much it's worth

■ DAVE MOSHER | OCT 17, 2017, 12.50 AM

What the hell is a neutron star?

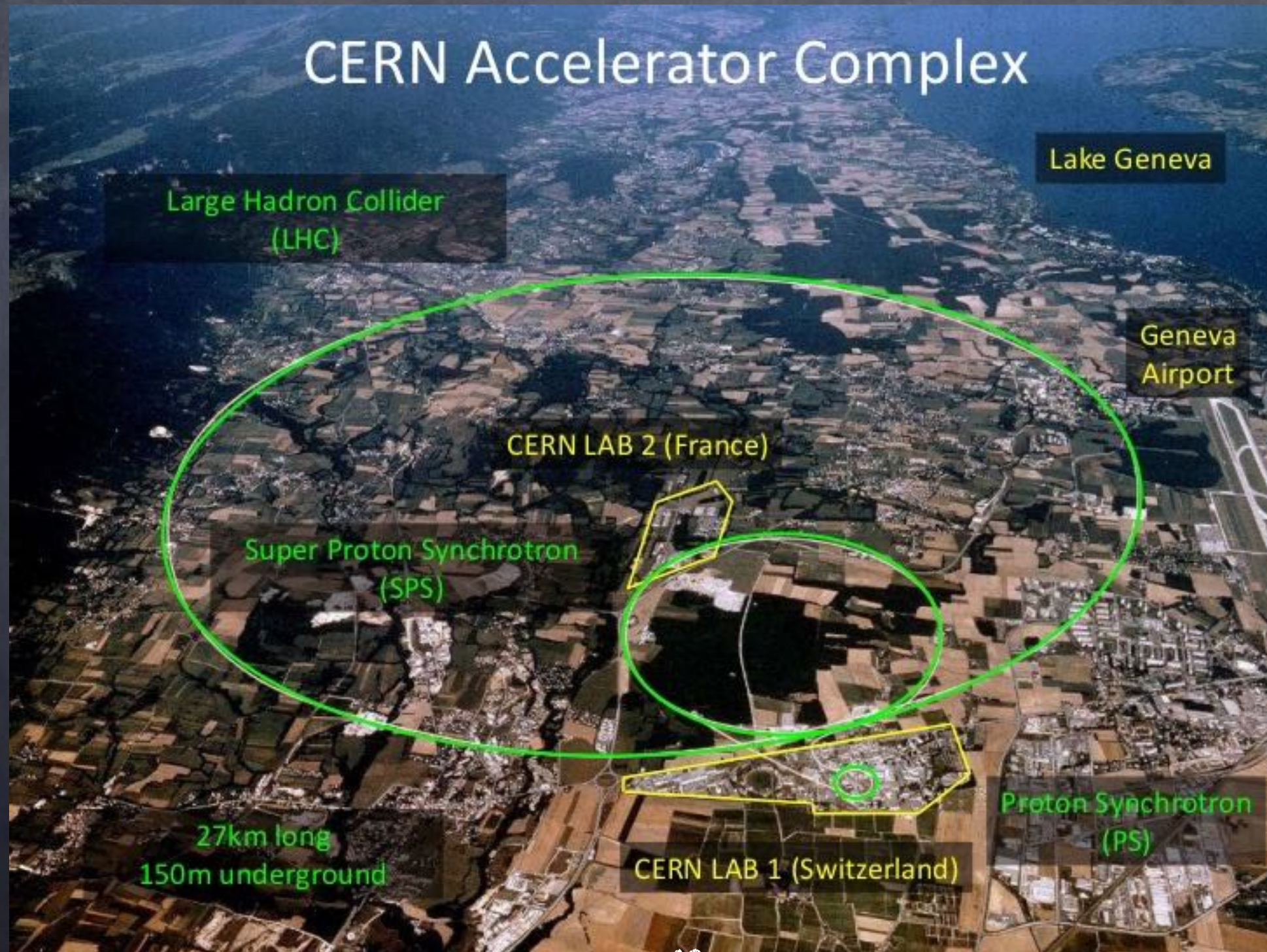


Binary Neutron Star Merger

- 4. NS_NS merger

CERN

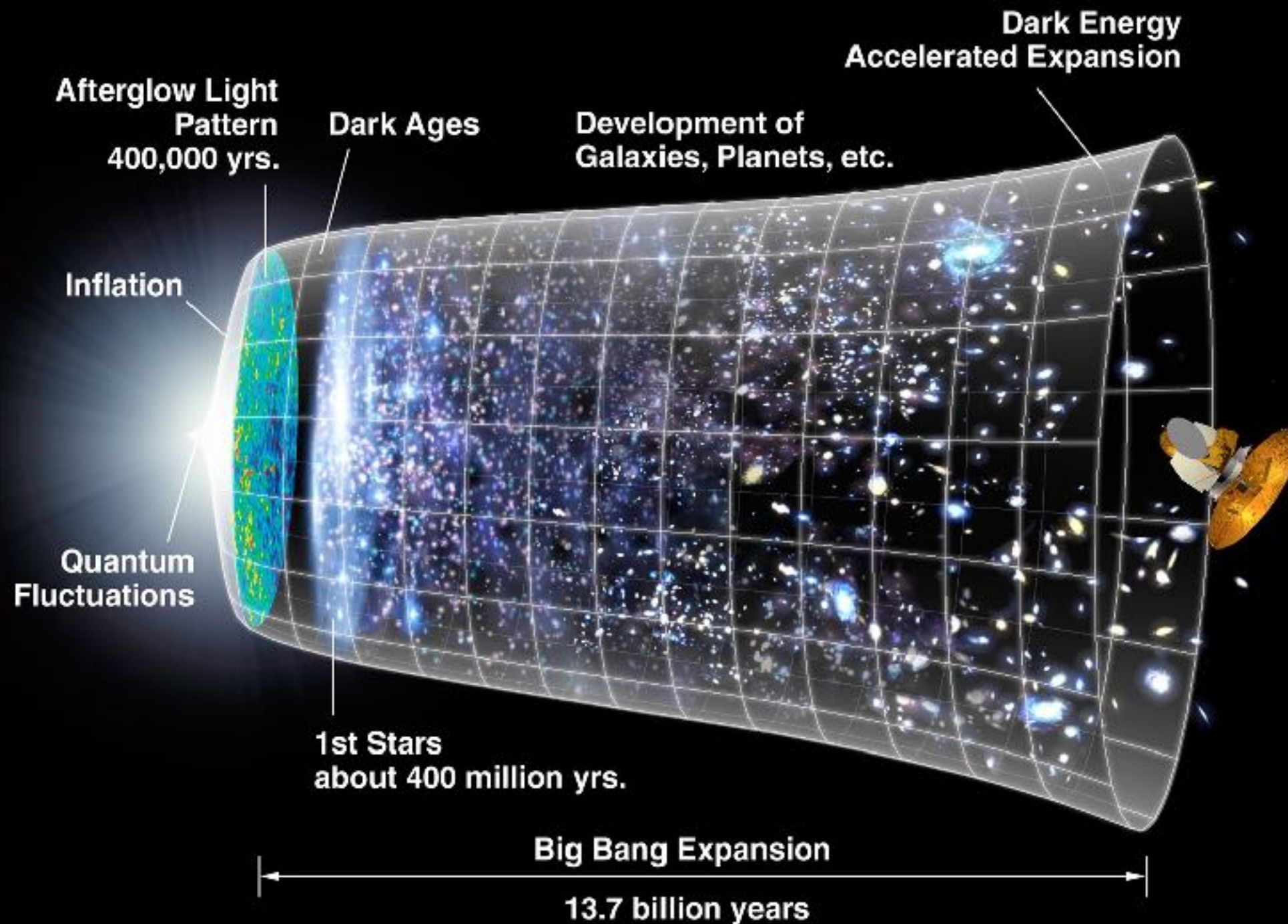
Detected Higgs Boson ("God Particle")





India is now a member state :)

Dark Energy



Q: "What jobs can you get
after a PhD?"

Q: "What jobs can you get
after a PhD?"

Q: "What are its applications
for the society?"

Q: "Why learn
physics(/math/bio)
if I'm never going into
research(/engg./medical)?"

Physics in CS market: Quantum Information

Futurism

Hard Science

**The Future of Cybersecurity Is in High-Speed
Quantum Encryption**

Physics in CS: Neural Networks



MIT Physics
@MIT_Physics

Follow



Move over, coders — physicists will soon rule Silicon Valley wired.com/2017/01/move-c ... @MIT @ScienceMIT @WIRED #physics #Alumni



To Solve Its Hardest Problems, Silicon Valley Turns to Physicists

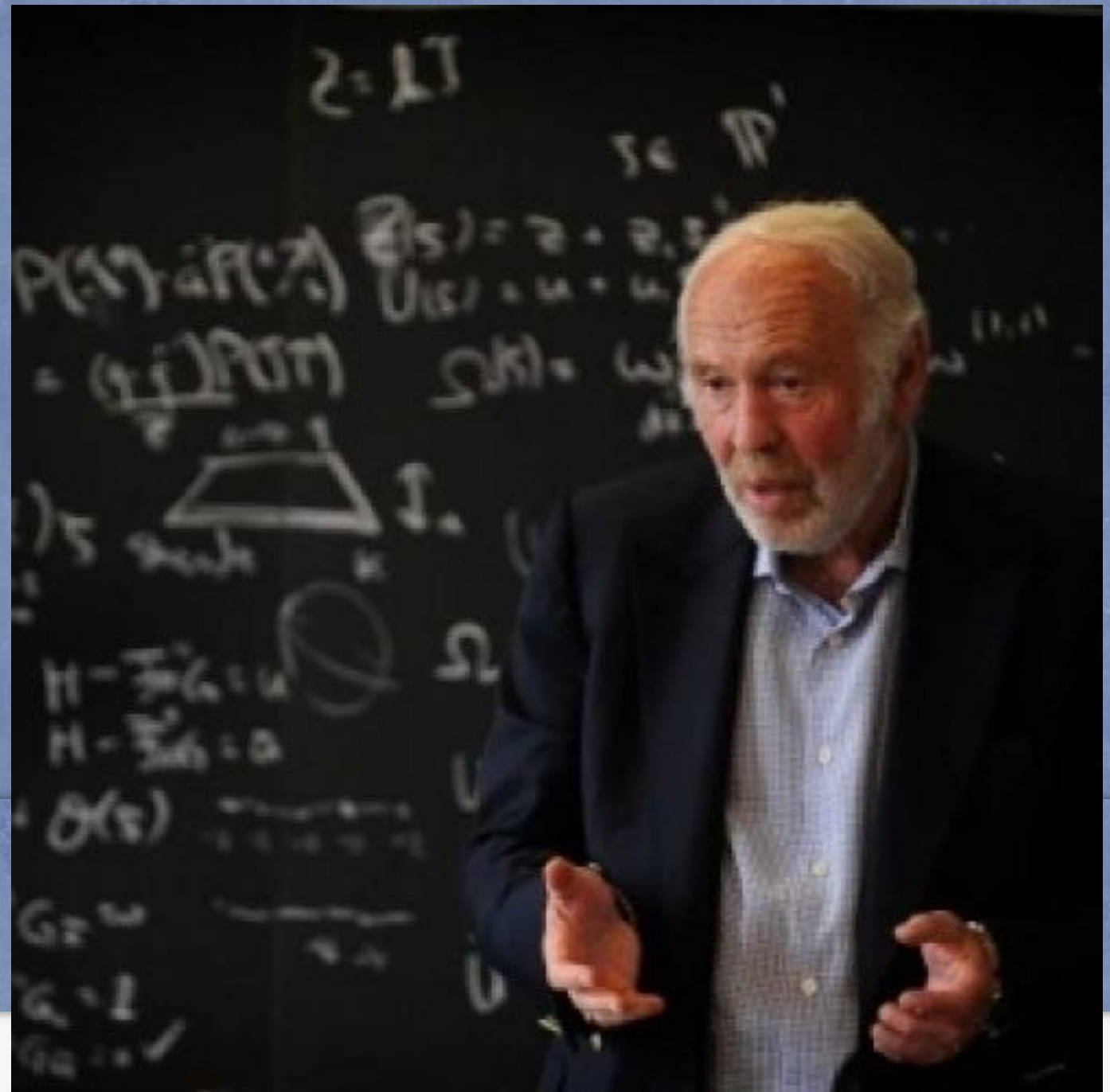
As the technological challenges of tech companies get bigger and badder, a crowd of physicists is moving in on the engineer headcount

wired.com

6:56 AM - 23 Jan 2017

42 Retweets 65 Likes





Billionaire James Simons: Conquering Wall Street with Mathematics

Biological Research

• CRISPR Cas-9

Disruptive CRISPR gene therapy is 150 times cheaper than zinc fingers and CRISPR is faster and more precise

[Gene Therapy Net .com](http://GeneTherapyNet.com)

Q: Does India have an education system or exam system?

• **Chemistry:**

Ruttofy 50 reactions or
learn one concept?

• **Physics:**

Understand basics–

If you memorize a lot, you're doing it wrong.





Q: Does India have an
education system or exam system?

- Make learning interesting, curiosity based
OR
Make studying a burden?

Research & Development (R&D) in India



India still lagging in innovation, R&D spend

Country/Region	Expenditures on R&D (billions of US\$, PPP),	% of GDP PPP	Expenditures on R&D per capita (US\$ PPP),	Year
 United States	473.4	2.742%	1,442.51	2013
 China	409	2.1%	298.56	2015
 European Union	388.3	2.03%	764.3	2014
 India	66.5	0.85%	39.37	2015

Research & Development (R&D) in India

Scroll.in

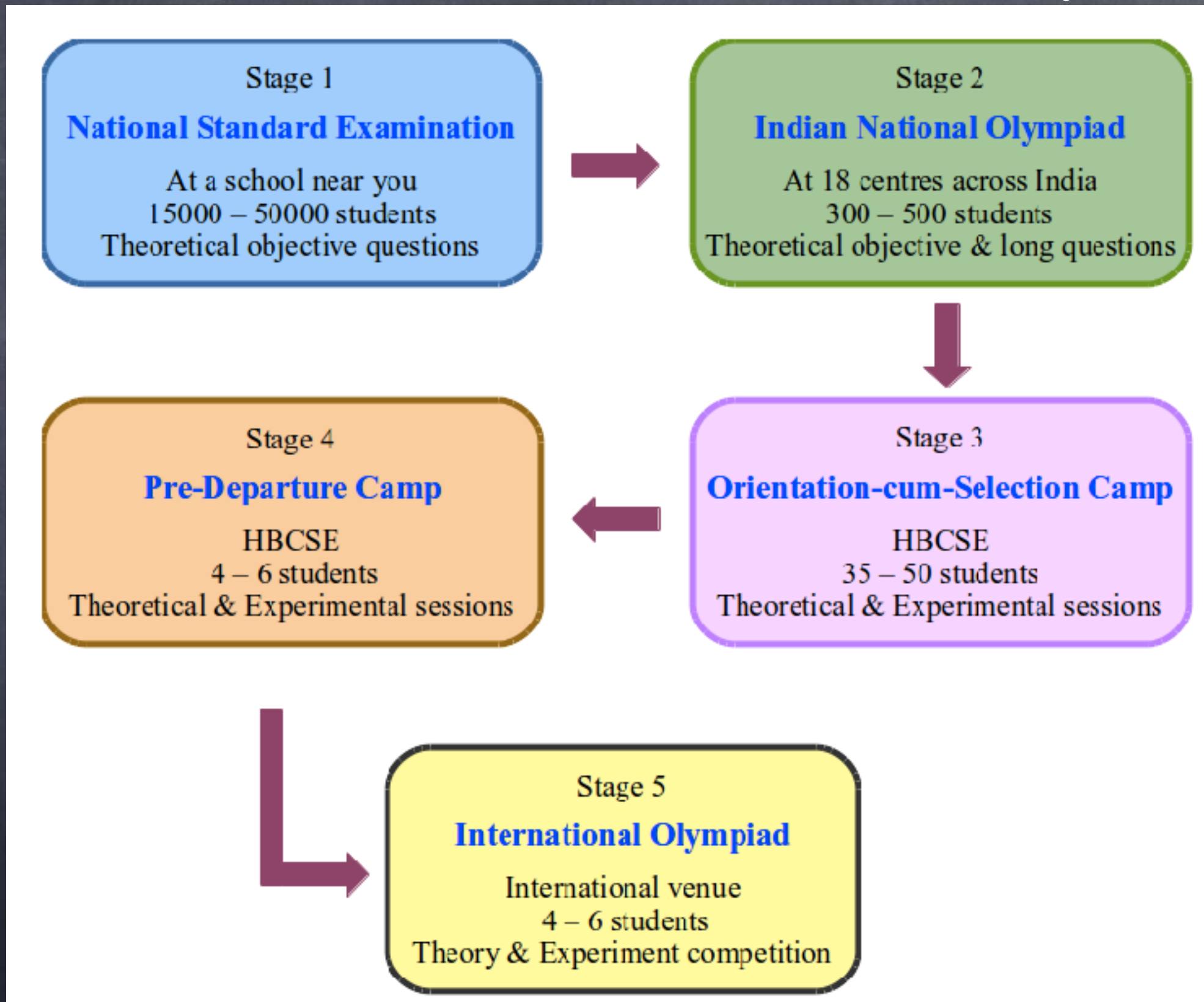
**Why do Indian medical institutions produce so few
research papers?**

“The most shocking statistic is that over the last ten years, 332 out of the 579 medical teaching institutions in the country have not produced a single research paper.”

International Science Olympiads

- Physics, Chemistry, Biology & Astronomy Olympiads (11th & 12th std)
- Mathematics Olympiad [RMO] (11th std only)
- Junior Science Olympiad [IJSO] (9, 10th)
- Recognized by universities throughout the world

International Science Olympiads



NTSE fellowship



- For class 10th
- There are two levels to qualify:
 1. Stage-1: Nov
 2. Stage-2: May, All India

KVPY fellowship



- Kishore Vaigyanik Protsahan Yojana (KVPY)
- There are two levels to qualify:
 1. Written Aptitude test in 11th std
 2. Interview with professors

KVPY fellowship

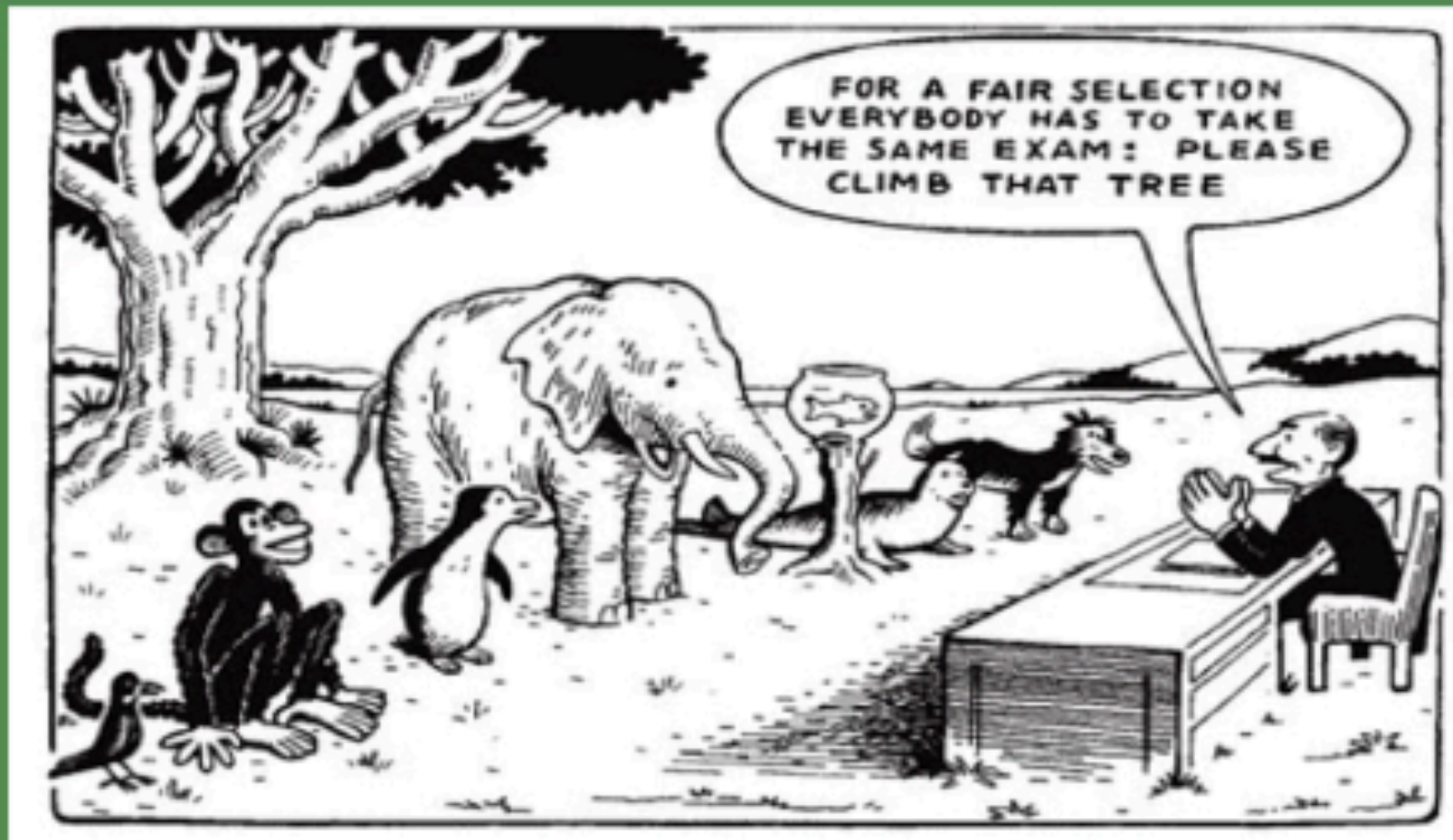


- KVPY ensures **direct admission to IISERs, IISc** and your college education is almost **fully funded**.
- You are eligible to attend camps at IISERs & IISc where top-notch researchers from all over the world give talks.
(Past noble-laurates, R&D heads of companies like IBM are among the speakers)

General	Science	Maths	English	Computer	Other
NTSE, IAIS, ASSET	NSEJS, NLSTSE, SLSTSE, IOS, NSO, SSTSE, KVPY	RMO, IMO, IOM, NIMO	IOEL, IEO	NCO, UCO, ZIO, HIO	NSEA, GeoGenius, NBTO, KO, SKGKO, iSSO

- List: www.toppr.com/bytes/competitive-exams-for-school-students/

Choosing a career



"Everybody is a genius. But if you judge a fish by its ability to climb a tree, it will live its whole life believing that it is stupid"

Albert Einstein

Choosing a career

Age for choosing a career:

- India: 16 yrs
- US: 20 yrs

Engineering Exams

- JEE mains
- JEE advanced
- BITSAT & others
- Where to do coaching?

Undergrad US

- SAT exam
- Extra-curricular activities
- Pros: Better Resources, Future opportunities
- Cons: Expense

IIT programs (for research)

- Engineering Physics (B.Tech) program at some IITs like Bombay, Delhi, Madras, Roorkee, etc
- BSc programs at IIT Kanpur
- IITs also give you a lot of exposure about other engineering fields, industries, businesses and other careers as well.

BSc programs

- IISERs (BS-MS 5 year program)
- IISc (4 years BSc program)
- CMI [Chennai Mathematical Institute] (3 years BSc program)

Thank you!

Questions?

digvijay.wadekar@gmail.com

Graduate Level Research Opportunities in India

- TIFR (Tata Institute for Fundamental Research), Mumbai
- IISc (Indian Institute of Sciences), Bangalore
- IUCAA (Inter-University Centre for Astronomy and Astrophysics)