

DE LA RECHERCHE À L'INDUSTRIE

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# A ~~student's~~ young researcher's point of view

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- Seven years ago, I started cutting my teeth by doing a PhD (at CEA-Saclay, IRFU) in gamma-ray astronomy in the H.E.S.S. collaboration and later on in the VERITAS collaboration as a post-doc (at University of Delaware, USA)
- Now working as a permanent researcher in CEA-Saclay, IRFU on neutrino oscillation physics within the Double Chooz collaboration and the CeLAND project.
- How did I come into doing research in high energy physics?
  - Well... It was not something decided a long time ago. This choice progressively made sense into my mind as I was studying at school.
  - My interest to science was obvious since high school, and then further strengthened because I met a very good mathematics teacher and a very good physics teacher later during my studies.
  - I then first wanted to be an engineer, but then changed my mind to steer myself toward fundamental research activities. Doing research is the best way to continuously learn and satisfy my curiosity.

- Education system in France quite particular. Basically, you can either follow a full university academic path as usually done in other european countries or take another path (supposed to be taken by the best students after high school...), which is the one I followed:
  - After high school degree, I entered a 2-year « preparatory school » in Caen for entrance examination to the French engineer schools. This is equivalent to an undergraduate level 2 years after high school.
  - I then did a 3-year physics engineering academic program at the physics engineering school of Grenoble
  - I did a 1-year research master degree in high energy physics at the University of Grenoble. This was done in parallel to my 3<sup>rd</sup> year of engineering academic program. Equivalent to graduate level.
  - 3 years of PhD at CEA-Saclay, IRFU- Particle Physics Division on gamma-ray astronomy within H.E.S.S.
- 9 years of studies after high school is what you need in France to get your PhD in high energy physics.

- PhD is necessary but not sufficient to get a permanent position in academic research...
- Can dissuade people to continue in this field, or even to choose to do a PhD! After a 5-year engineer degree, you can find a job and already earn a good living (actually better living than researchers).
- Really motivated and passionated people arrive at a post-PhD stage. After getting your PhD, you can:
  - The easiest: find a job into another field, e.g industry or finance. Not easy in France though. First because of the current economical situation all over Europe. Second because PhD degrees are not as well considered in France as in other countries.
  - The hardest: continue in the research field, and then apply for post-doc positions until you find a permanent position. Finding a post-doc position in France is hard, due to lack of fundings... One often needs to go abroad...
- I went in the US to do my post-doc: well-appreciated in my CV and good salary.

- In France, academic research is mostly articulated around laboratories (or units) which are connected to universities.
- This is true for CNRS, but CEA does not follow this arrangement, mostly for historical reasons. CEA is not officially linked to any universities, though it is not completely true because otherwise we could not welcome PhD students for example.
- In the quest of a permanent (stable) position, you can apply to two kinds of position:
  - Junior professor position (maître de conférence), affiliated to a CNRS unit, doing half research, half teaching. You need to demonstrate teaching skills before applying to this kind of position.
  - Permanent CNRS/CEA full time research position : CR (chargé de recherche) junior position or DR (directeur de recherche) senior position



- In France, number of permanent positions in academic and fundamental research is decreasing. We all know why... We might not be the country with the worst situation though.
- Recruitment procedures and fundings change very often and it's hard to organize a reliable plan for yourself when you decide to enroll into this path.
- I've met people in their 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> post-doc position! This situation shouldn't exist: no stable situation, difficult to build a family, etc. Might only be convenient for (young) people who don't like to settle down (they must be not so many of them...)
- Public young researcher's opinion: "It is impossible to get a permanent researcher position, I don't stand any chances given the small number of open positions (and I don't believe in Santa Claus anymore...) »

# About CEA-IRFU and IN2P3 PhD staff

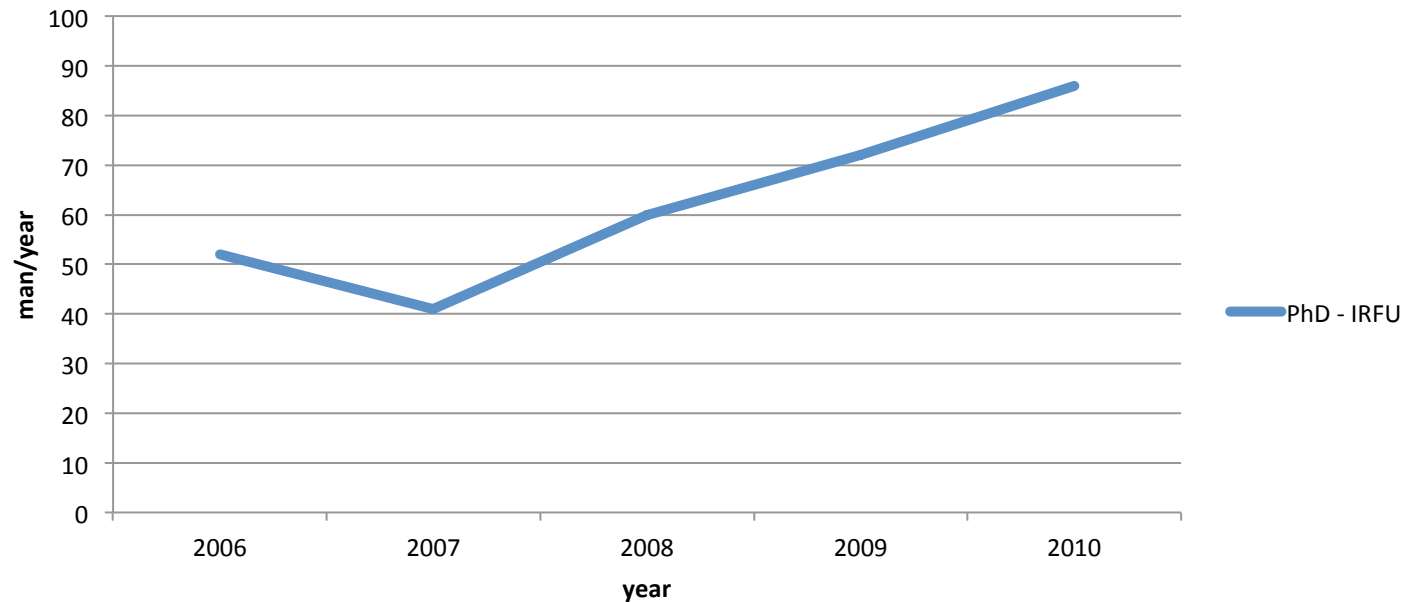
\*Many thanks to Delphine Drouet and Christine Tiquet  
from the IRFU human resources group

\*Numbers for IN2P3 retrieved from a presentation given at IN2P3-IRFU  
prospectives 2012 at Giens



*All of what follows has to be taken cautiously, and might not reflect accurately  
the reality. Numbers are showed to present the basic trends...*

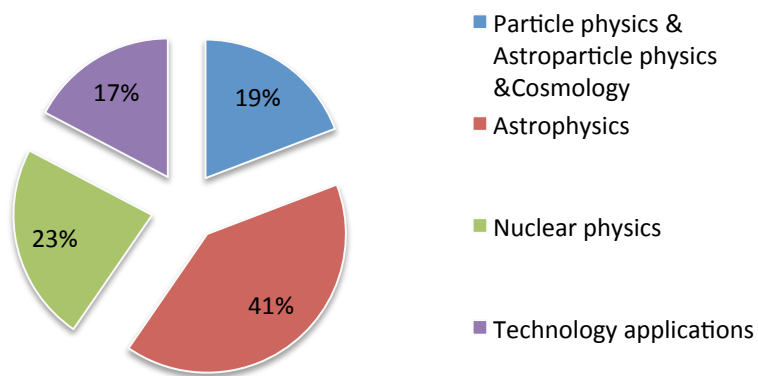
## Number of allocated PhD IRFU



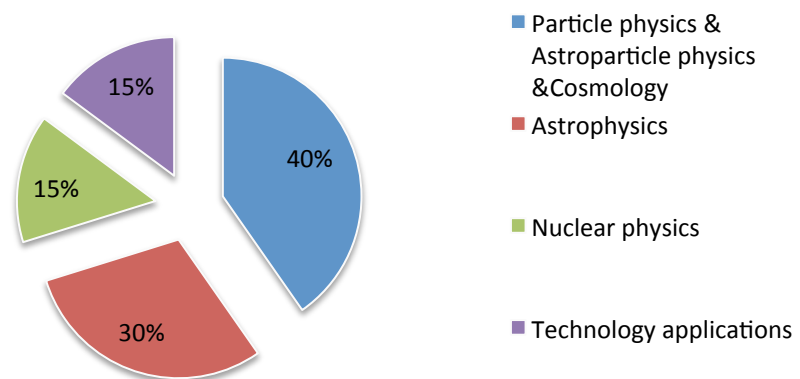
- Regular increase of the number of PhD
- Same trend at IN2P3



**PhD subjects filed by topics  
IRFU 2006**



**PhD subjects filed by topics  
IRFU 2011**

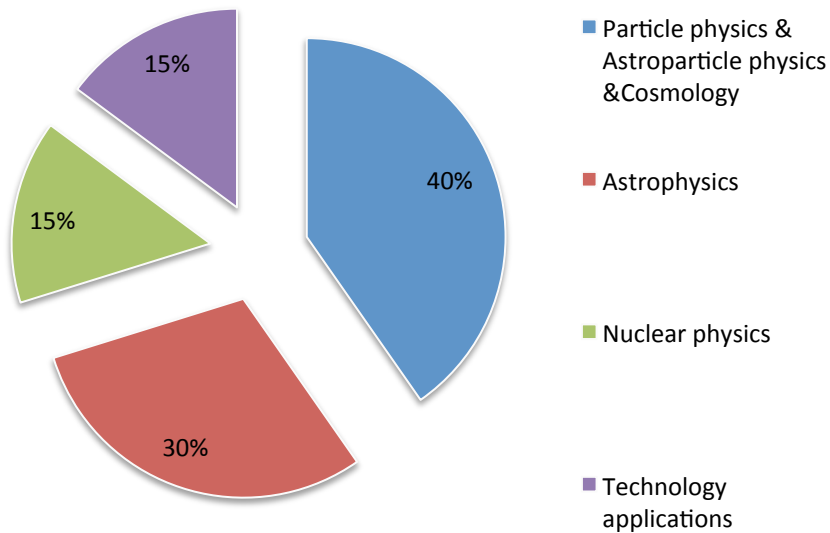


\*Technology applications = Engineering and technical departments

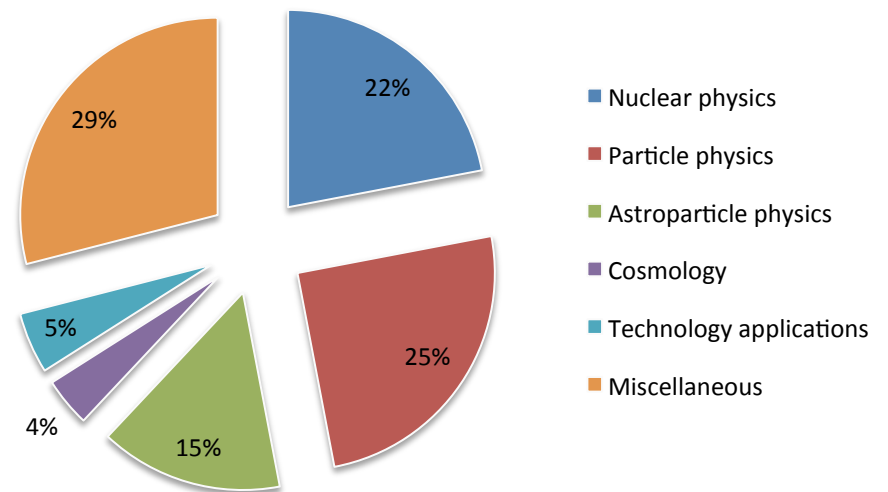
- Regular increase of the number of PhD
- Significant changes of PhD repartition by topics (Astrophysics → (Astro)particle physics & Cosmology)

## Comparison to IN2P3

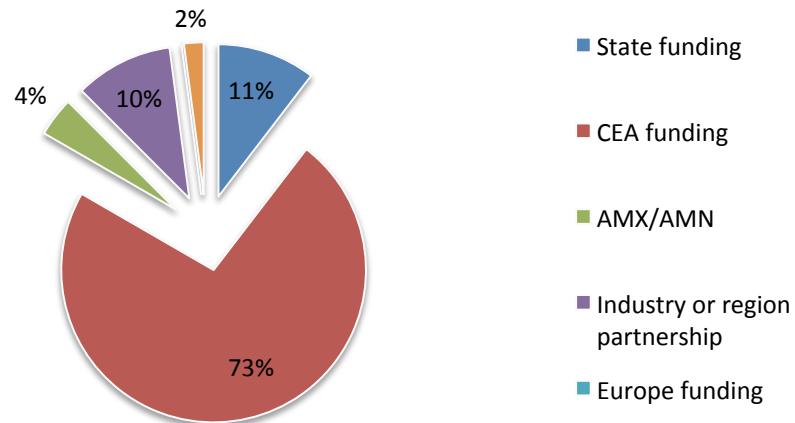
**PhD subjects filed by topics**  
**IRFU 2011**



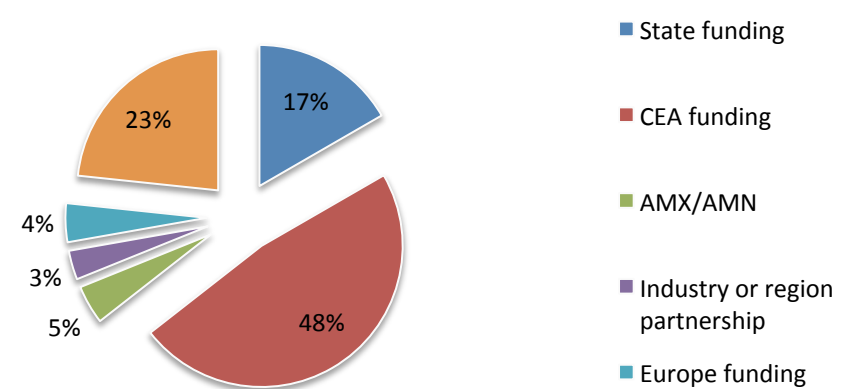
**PhD subjects filed by topics**  
**IN2P3 2011**



**PhD funding method  
IRFU 2006**



**PhD funding method  
IRFU 2011**

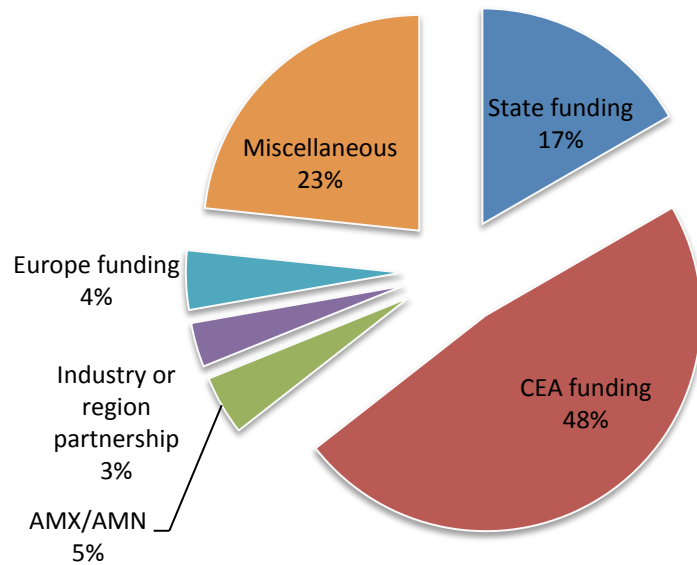


\*AMN/AMX = ENS/Ecole polytechnique fundings

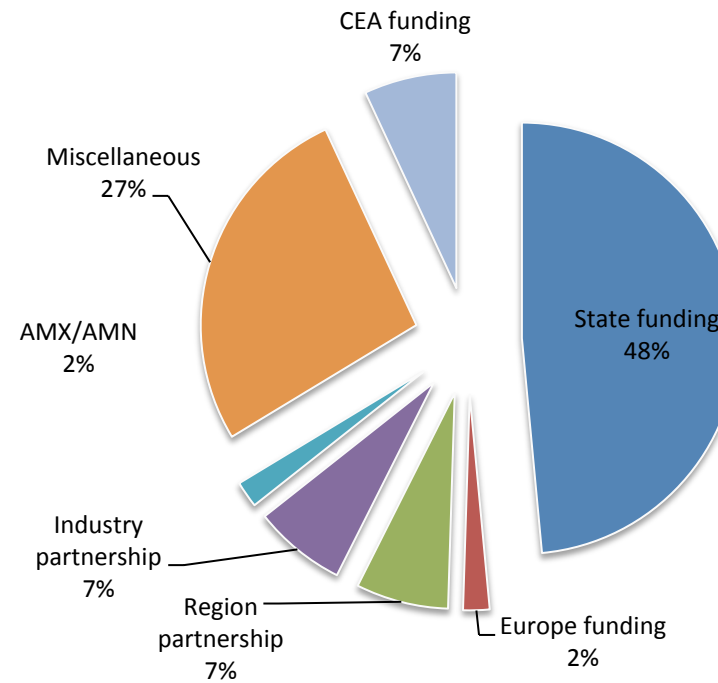
- Drop of CEA funded PhD (but twice more funded PhD in 2011)
- Slight increase of state funding. Europe funding very poor...
- We now further rely on « external » funding methods (labelled « miscellaneous » in the graphs)

## Comparison to IN2P3

### PhD funding method IRFU 2011

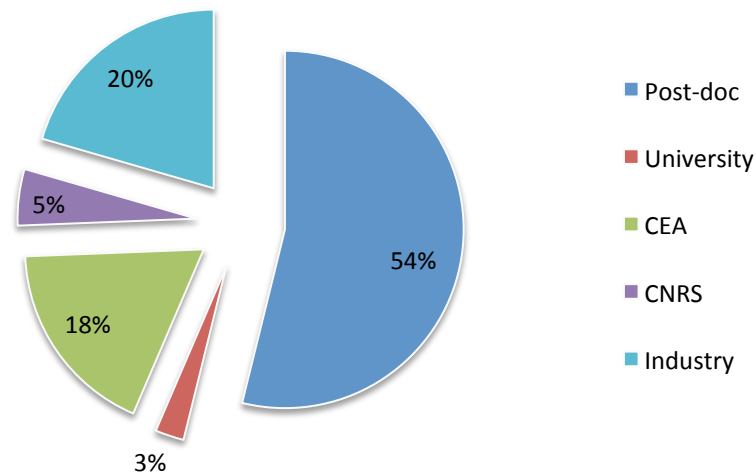


### PhD funding method IN2P3 2011



- Informations gathered for the 2006, 2008 & 2009 years (thanks to Anne-Isabelle Etievre) – might not be representative of the IRFU situation
- No unemployment informations available

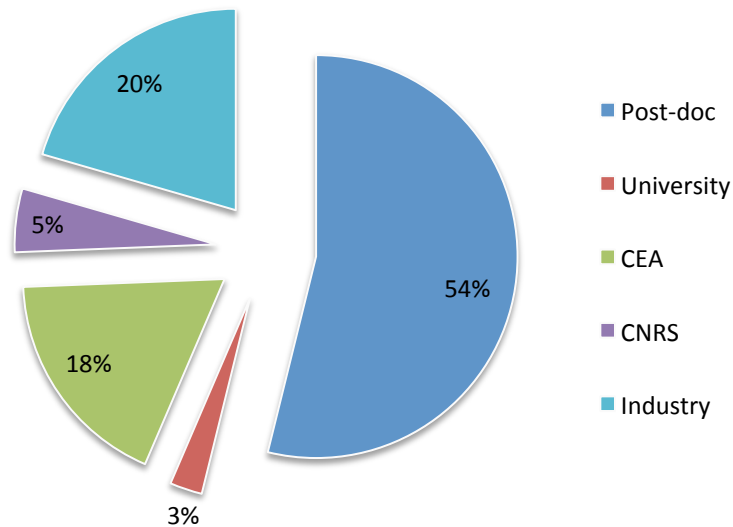
## After a PhD... IRFU 2006, 2008 & 2009



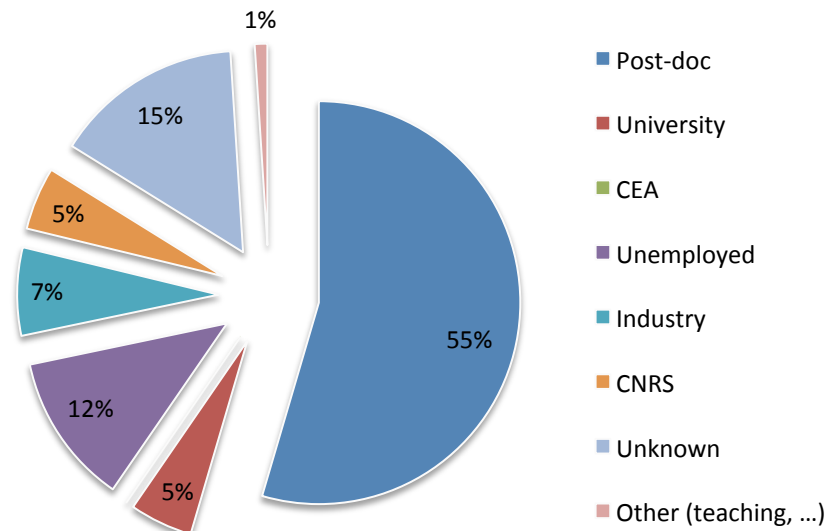
- More than half of PhD students continue doing research via a post-doc

## Comparison to IN2P3

**After a PhD...**  
**IRFU 2006, 2008 & 2009**



**After a PhD...**  
**IN2P3 2011**

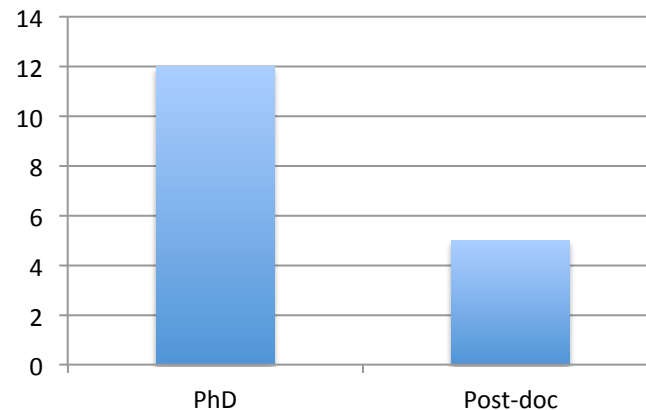


# About some French young researcher's point of view

(Many thanks to all of the young researchers working at the Particle Physics Division of IRFU who took time to answer my questions)



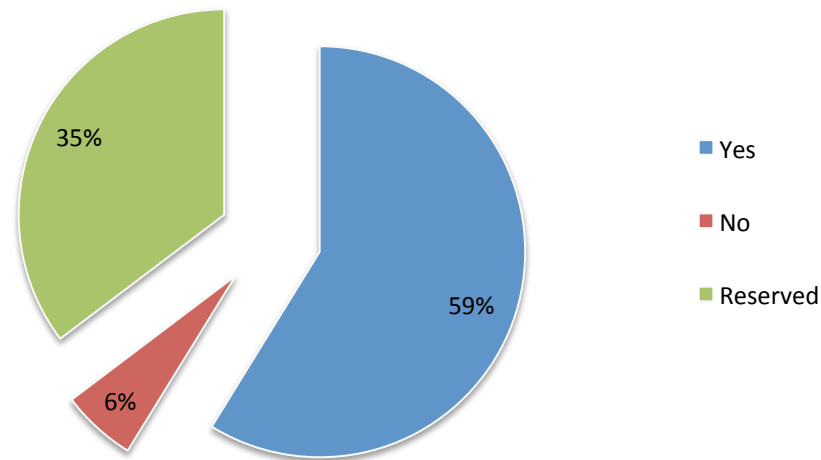
- A questionnaire has been sent to as many young researcher as possible in the Particle Physics Division of IRFU
- Lot of them did not answer, especially those working out of the lab, for example those working at CERN...
  - Maybe because of the French scholar vacations at this period of the year...?
  - People too busy...?
  - People feel that they contribution would be useless...?
- The sample totals 17 people:





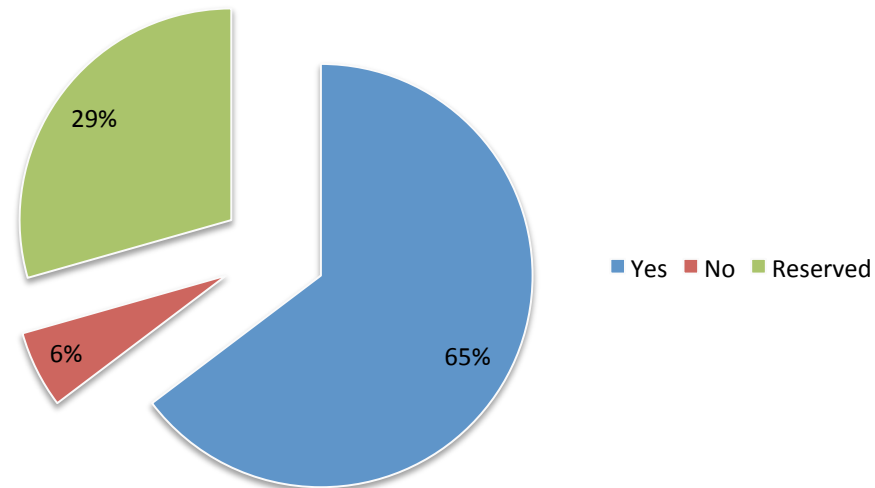
- Most frequent answers:
  1. Interest on HEP developed during studies and undergraduate degree course
    - Internship in HEP labs
    - Visit of HEP labs
  2. Construction of big instruments, high level technology development (attractive for students in engineering)
  3. Passion and fascination about the understanding of the ultimate states and interactions of matter

- Is your collaboration with permanent and non-permanent researchers satisfactory?



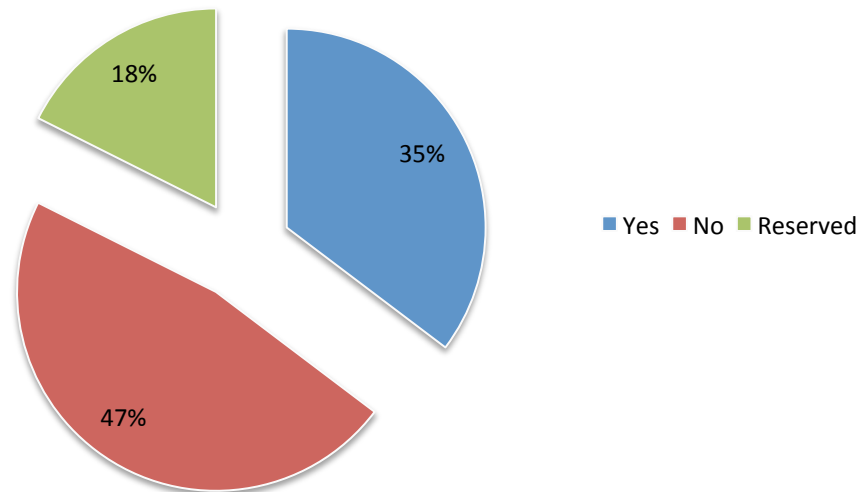
- Comments:
  - Collaboration for service work is more difficult. Physics analysis related work is fine.
  - Easier with non-permanent because less busy

- Do you think that the scientific opinion of young researchers is properly taken into account within groups and collaborations?



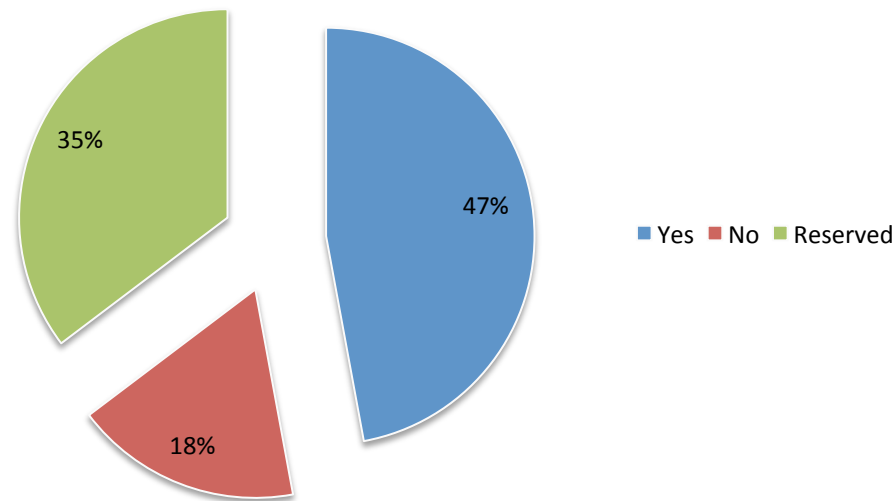
- Comments:
  - Depends on the collaboration and on the group
  - Reserved people said that young researchers are often assigned tedious work which doesn't need their scientific opinion to be properly done.

- Do you think that being a young researcher prevents you from having responsibilities?



- Comments:
  - A PhD should spend time on pure research
  - Post-doc should have more responsibilities

- Do you think that young researchers have scientific freedom?

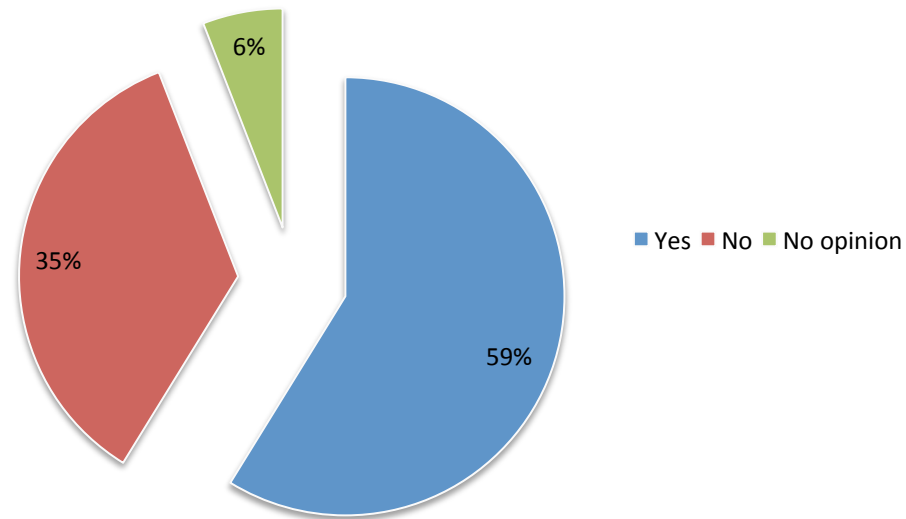


- Comments:

→ Depends on your supervisor's attitude

→ Shouldn't have too much freedom for PhD. Supervisors have to guide them in order to avoid them going toward the wrong direction.

- Do you think your salary is adequate?

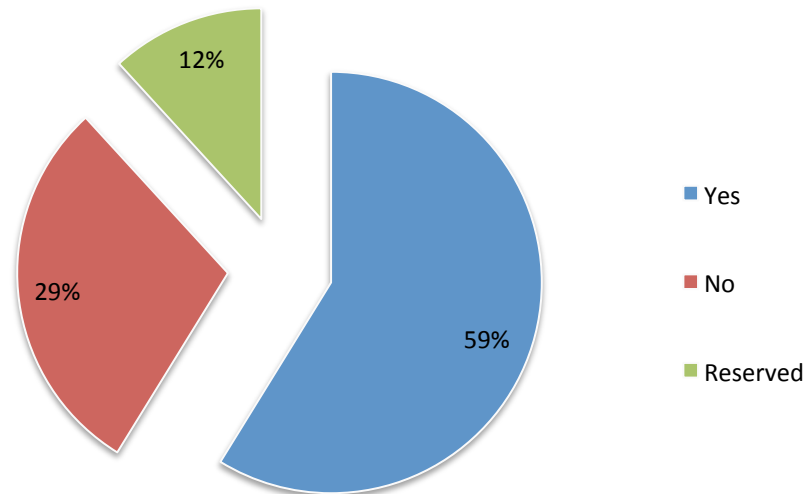


- Comments:

→ Depends on the city you live in

→ Inadequacy of the salary with respect to other professions (engineering, business,...)

- Do you think you have enough means to do research in a good way?



- Comments:
  - Ok for computer means. Not ok for traveling and conferences (IRFU is covering all of the traveling and conference costs).
  - Lack of funding (especially for small experiments) is getting worse years after years

- Which field other than academic research you think you can find a job in?
  - Computing
  - Medical physics
  - Engineering
  - Banking, finance, economy
  - Teaching
  - Private R&D
  
- Comments:
  - Most of the answers stated that they'd prefer not to have to search for a job outside the research field...
  - In France, a PhD is not as valuable as an engineer degree...



- What do you want to do in the future?

Almost everybody answered:

**get a permanent position to continue academic research**

They don't believe they would get one and continue doing research though...

- What my colleagues also would like to:
  - Reach economical and geographic stability more easily, especially as concerns the post-docs
  - Have the opportunity to finish a scientific research activity without interrupting it because of the accumulation of different positions
- In the light of your experience, would you choose this field again?

Almost everybody answered:

**YES!**

- Number of PhD students doing HEP research in France regularly increases over years, but...
- ... Number of available permanent positions decreases
- Various selection procedures and requirements for permanent positions make it difficult to plan a career (and life plan) reliably
- Ph. degree is not well-recognized in France, PhDs go abroad ("fuite des cerveaux" = brainy people's leakage)
- **Uncertain future for young people enrolling in HEP academic research**