

# Interest of Students in Physics

A pseudo-study of the minimal marks to enter a  
Physics / Engineering Physics degree in PT. Univ.'s

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**TÉCNICO**  
LISBOA

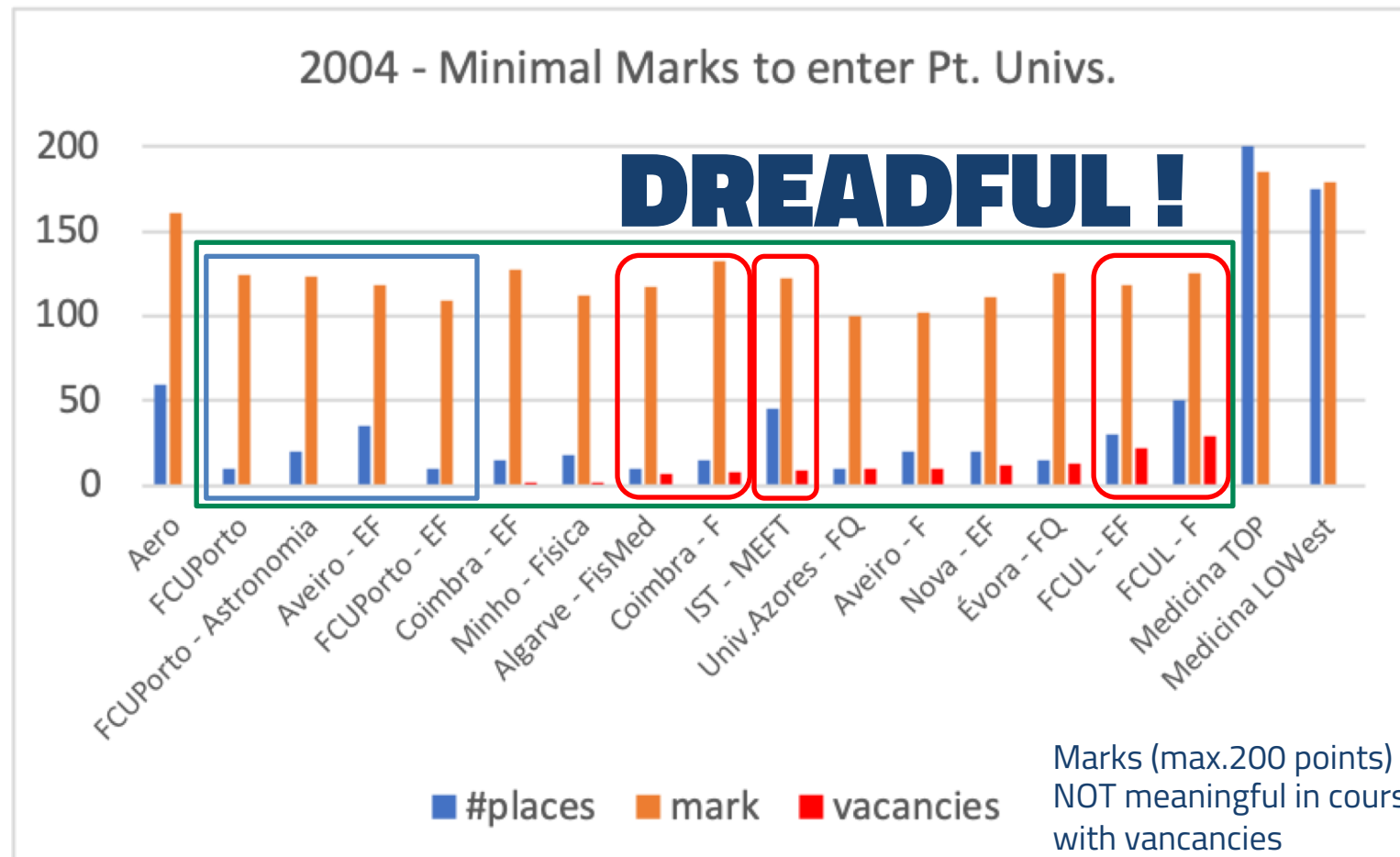
IPPOG Autumn Meeting,  
CERN, November 2019



# // The situation in 2004...



- #Students joining Physics/Engineering Physics in Pt. Universities, compared to Aerospace Eng. and to Medicine





**We need to act!**

# // The LIP Outreach Activities...



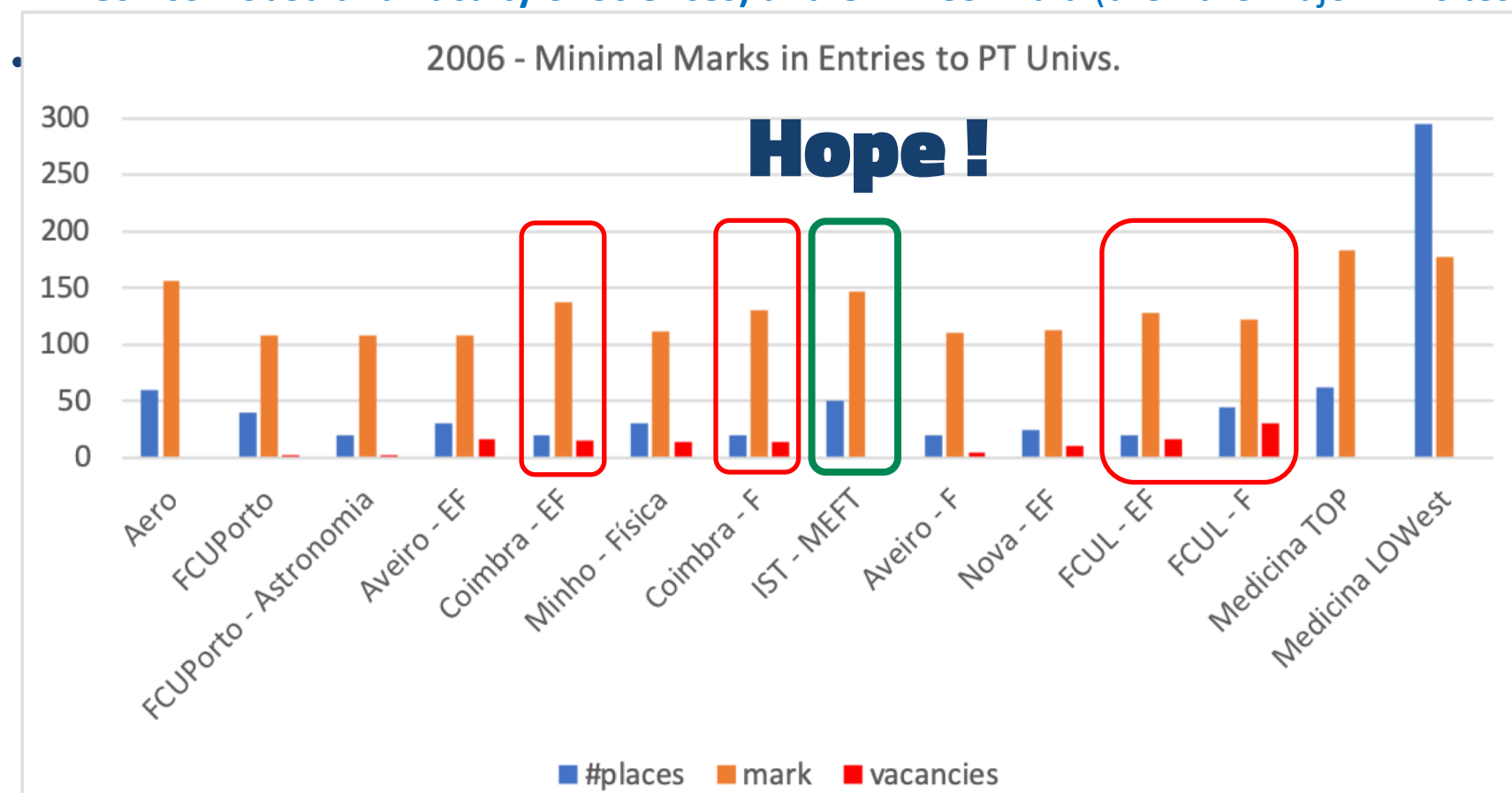
- In 2004, LIP started to strengthen significantly the interaction with high-schools
  - **The Cosmic Rays Project in 10 Schools** (discontinued in 2007, after “EuroCosmics”)
  - **The Environmental Radiation Project with up to 50 schools** (until ~2014)
  - **Started the Summer Internships** (still running!...in summer ☺ )
  - **The visit to CERN on the 2004 Open Days**, challenged by former Ministry José Mariano Gago, as one of the events celebrating the CERN’s 50<sup>th</sup> Anniversary, involving 2 professors, Ciência Viva’s executive Diretor and 10 students from the 10 schools hosting cosmic rays stations.
- **2005 – World Year of Physics** – was celebrated in Portugal in many ways, among the most important for Particle Physics being the **organization in Lisboa of the EPS HEP’2005**, with a public session co-organized by LIP and Ciência Viva  
*(The previous time in 1981 marked the launch of the preparations for Portugal to build a community of Experimental Particle Physicists and to join CERN, something that*



# // The LIP Outreach Activities...



- ...and the other being the launching of EPOG's first **Internacional Masterclasses in Particle Physics** in 2005, in which LIP participated with ~100 students at Lisboa (IST – Técnico Lisboa and Faculty of Sciences) and Univ. Coimbra (then the major LIP sites)



# // The Role of the Teachers



## CERN Teachers Programmes

- High School Teachers Programmes at CERN started in 1998 (3 weeks long, 1/year)
- International, now 2 weeks long, 2 editions/year (July, August), holidays time
- Up to 48 teachers from many countries, in particular 1-2 from CERN member states



## International High School Teacher Programme 2019



# // National Teachers Programmes



- Member State National Teachers programmes launched in 2006
- One pilot programme in 2006 (Hungary) and since then about 35 programmes / year
- One week only, in formation time
- In the language of the Member State and many more opportunities per country



- **Portuguese [Language] Teachers Programmes** yearly from 2007 up to now
- In Portuguese Language, avoiding linguistic barriers (specially for questions)
- One week, formation time, officially certified for the Teacher's Career Progression with the Ministry of Education
- Organized by CERN and LIP, with partial financial support from **CIÊNCIA VIVA**
- Portugal started immediately in 2007, organizing one programme / year
- Portugal proposed to receive teachers from Brazil and Mozambique in 2009, and from other Portuguese speaking countries since 2010, becoming the first non-English international programme
- Promote/increase interactions between Portuguese teachers and scientists (at CERN or in the country) and, since 2009, including Brazilian scientists
- Promote/increase interactions between teachers in portuguese speaking countries



# // CERN PTLTP – Intensity!



- Theory:**

Introd. Particle Physics

Astroparticle Physics

Accelerators/Detectors

Data Acquisition&Treatment

Applications

Universe/Cosmology

- Practice:**

Hands-on a Cloud Chamber

Hands-on real LHC Data

Visits to CERN Expts.+Labs

- Fun: Film “Particle Fever” + Questions&Answers, peddy-paper@Geneva in teams...**

hours	Sunday, 1	Monday, 2	Tuesday, 3	Wednesday, 4	Thursday, 5	Friday, 6	hours							
08:30	<b>Sunday</b>  Travel Lis-Gva (TAP) (7h10-10h30), Opo-Gva (EasyJet)	BREAKFAST		Transport from the CERN Hotel to CMS	BREAKFAST	<b>Friday</b>  ECO@CERN: Education, Comm., Outreach Ana Godinho	08:30							
08:45							08:45							
09:00		Intro. to Particle Physics (Lesson 1/4) Filipe Joaquim	Intro. to Particle Physics (Lesson 3/4) Filipe Joaquim	Group 1: Visit CMS Cavern	Group 2: Particle Physics with Natural Accelerators Abreu		Portuguese Language Teachers Programmes: Impact in Brazil Nilsson Garcia	09:00						
09:15										09:15				
09:30		COFFEE BREAK		Particle P with Nat Acceler Pedro A	CMS vern		COFFEE BREAK		09:30					
09:45		Introduction Ph	Particle Physics on 4/4) Joachim				Move to	to CCC	The ATLAS Furn	<b>THEORY</b>	09:45			
10:00														10:00
10:30														
10:45													10:45	
11:00									11:00					
11:15							11:15							
11:30							11:30							
11:45		Basics of Particle Detection André David	Controlling "Cool" Accelerators André Rocha	Group Visit AMS	up 2: Visit CCC	Data Trigger Systems Clara Gaspar	Particle Physics and the Universe Pedro Abreu	11:45						
12:00	<b>PROGRAMME (2019)</b>			Move to CCC	Move to AMS			12:00						
12:15				Visit CCC Move to CERN	Visit AMS Move to CERN			12:15						
12:30		LUNCH CERN (75 minutes)			LUNCH CERN (50 minutes)		LUNCH CERN (90 minutes)		12:30					
13:00		LUNCH CERN (90 minutes)			LUNCH CERN (90 minutes)		LUNCH CERN (90 minutes)		13:00					
13:30		Move to SM18	Move to S'Cool Lab +µCosm	Group Photo at 13:55 + Meeting with PT Minister STHE	<b>Hands-on</b>	<b>Hands-on</b>		13:30						
13:45										13:45				
14:00	Introduction to the Programme Pedro Abreu	VISIT SM18	S'Cool (14: 15:00- 15:30)						Challenges in Particle Physics Pedro Abreu	14:00				
14:15										14:15				
14:30		Move to Rest.2								14:30				
14:45		WC Break								14:45				
15:00	Introduction to CERN José C. Silva	Visit AD	Visit LEIR					Questionnaires and Evaluation of the Program	15:00					
15:15									15:15					
15:30	Error and U. in Data A André D		Microsc Globe Break 4 to ATL (15: 17:00)					Charlotte Warakaule's Address	15:30					
15:45									15:45					
16:00									PROGRAM END	16:00				
16:15										16:15				
16:30	<b>Revisions!</b>									16:30				
16:45										16:45				
17:00										17:00				
17:15										17:15				
17:30	Welcome Drink & Groups Preparation	Rotation (~17h10)	Visit to ATLAS VC	Visit SC						17:30				
17:45		Visit LEIR	DataCentre							17:45				
18:00				Visit SC			Visit to ATLAS VC			18:00				
18:15										18:15				
18:30	Revision of the Day		Revision of the Day				Revision of the Day		18:30					
19:00									19:00					
19:30	DINNER CERN	DINNER CERN	DINNER CERN						19:30					
20:00									20:00					
20:15	<b>Cinema!</b>	CERN Virtual Visits Denis Damazio		DINNER GENEVA	BARBECUE .PT				20:15					
21:00		Film "Particle Fever" at the Main Auditorium							21:00					
22:45		Post movie questions and answers			Official Dinner				22:45					

# // CERN PTLTP – Participants!



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Datas	10-14/9	1-5/9	30/8-4/9	5-10/9	4-9/9	26-31/8	1-6/9	24-29/8	30/8-4/9	28/8-2/9	3/9-8/9	2/9-7/9	1/9-6/9	
Candid	205	241	191	218	190	250	162	236	187	183	170	181	222	2063
Candid (new)	205	169	78	130	98	165	57	121	96	63	40	48	77	1182
Pt.	43	45	44	45	41	35	34	35	24	22	20	20	20	428
Br.		1	11	20	20	30	31	30	22	20	20	20	20	245
Mz.			5	4	4	4		2	2	1				22
STP				1	1	1	1	1	1	1				7
CV				1	1	1		1	1					5
An.					4								2	6
TL					1	3	3		2					9
GB					1									1
Total	43	46	60	71	73	74	69	69	52	44	40	40	42	723

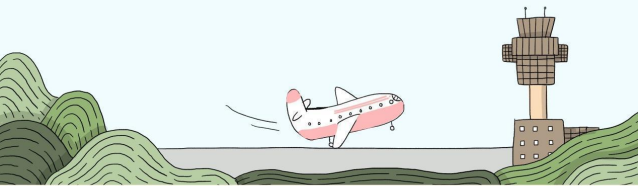
# // CERN PTLTP – All Pt-Speaking countries



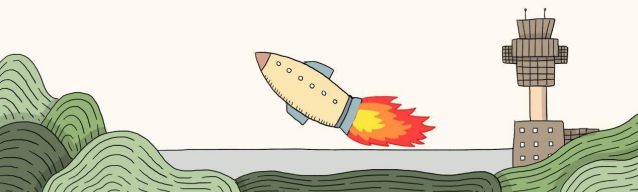
- 2011 – the full house – 73 Teachers – among the largest programmes at CERN (now fixed to maximum of 48)



73  
✂ TEACHERS ARRIVED.



73  
✂ SCIENCE MOTIVATORS RETURNED.

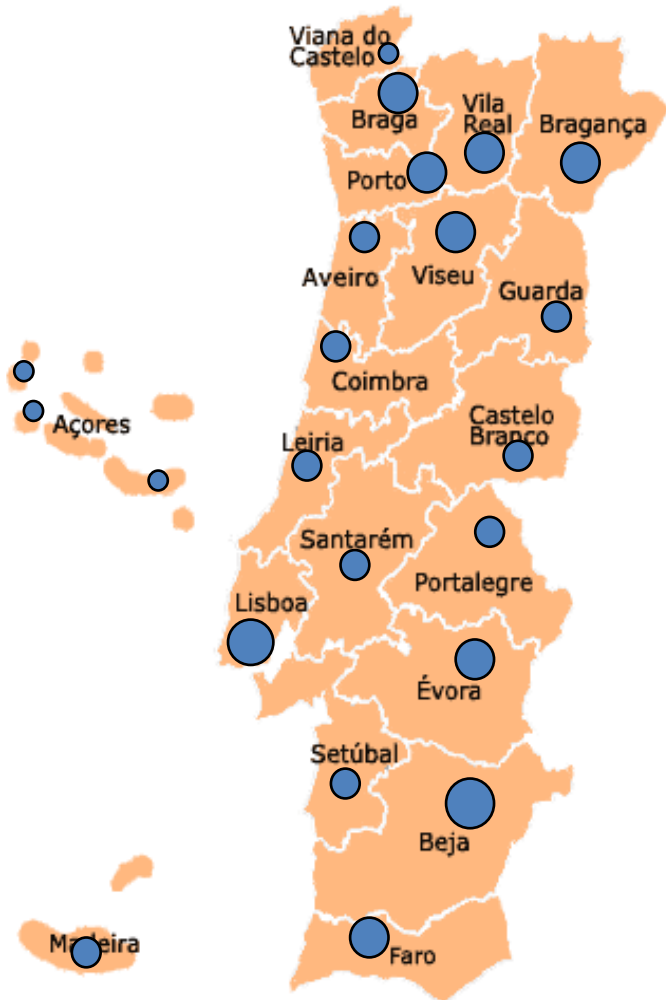


41 Pt, 20 Br, 4 Ao, 4 Mz, 1 CV, 1 STP, 1 GB, 1 TL

Very rich session about teaching conditions in all the countries

*"The most important training programme that I have participated in my life" as spoken by many teachers.*

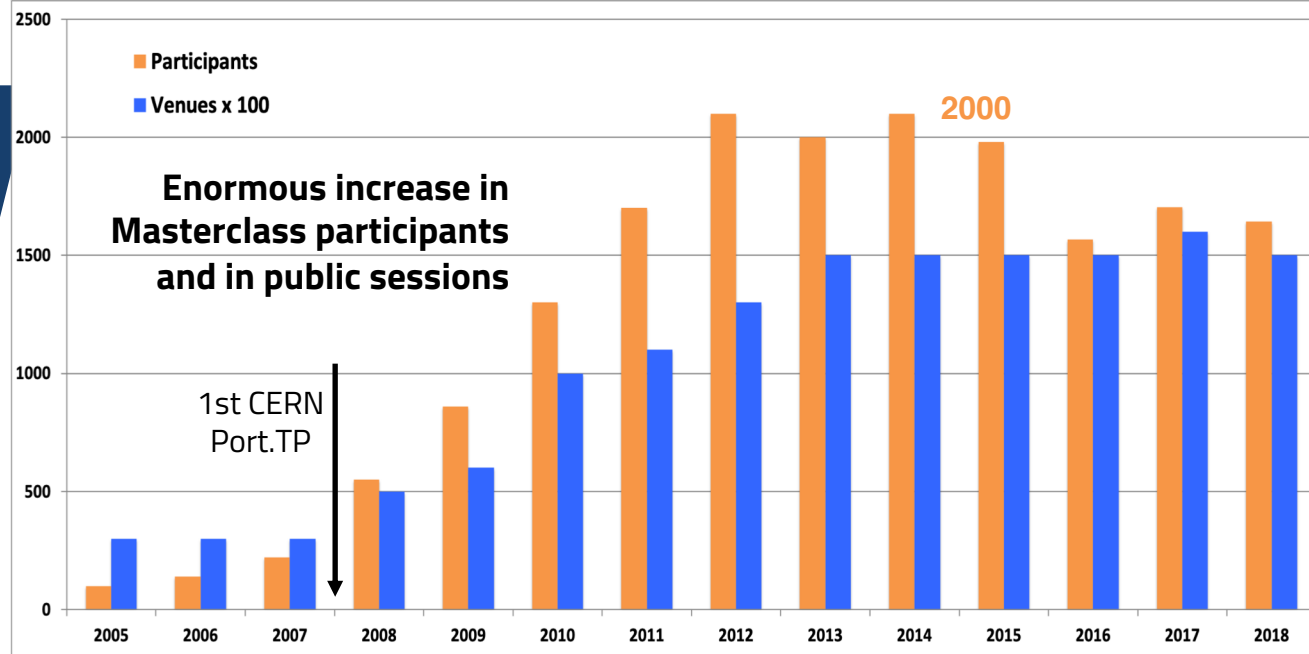
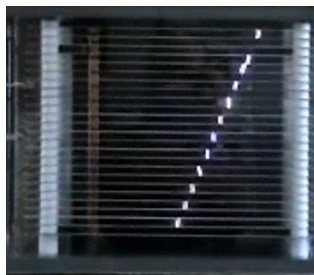
# // CERN PTLTP – Teachers from all over PT



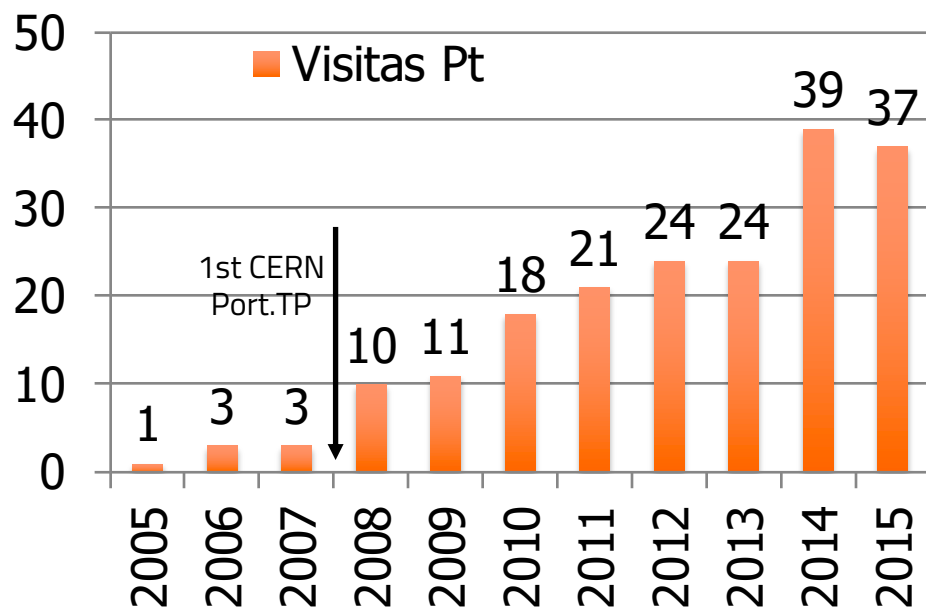
- Evaluation questionnaires =>  $4.88 \pm 0.15 / 5$
- Exponential increase in
  - requests of **School visits to CERN**
  - virtual visits to the CERN Experiments
  - **participation in the IPPOG's Int'l MC's**
  - participation in our outreach activities
  - requests for **seminars at their schools** / events
  - promotion of CERN and of Particle Physics in their communities and in other events



// **Coming back!**



## Visits of PT Schools to CERN



**Enormous Increase in School Visits to CERN**  
(PT and BR – also in Virtual Visits)

**Great increase in Seminars at Schools**

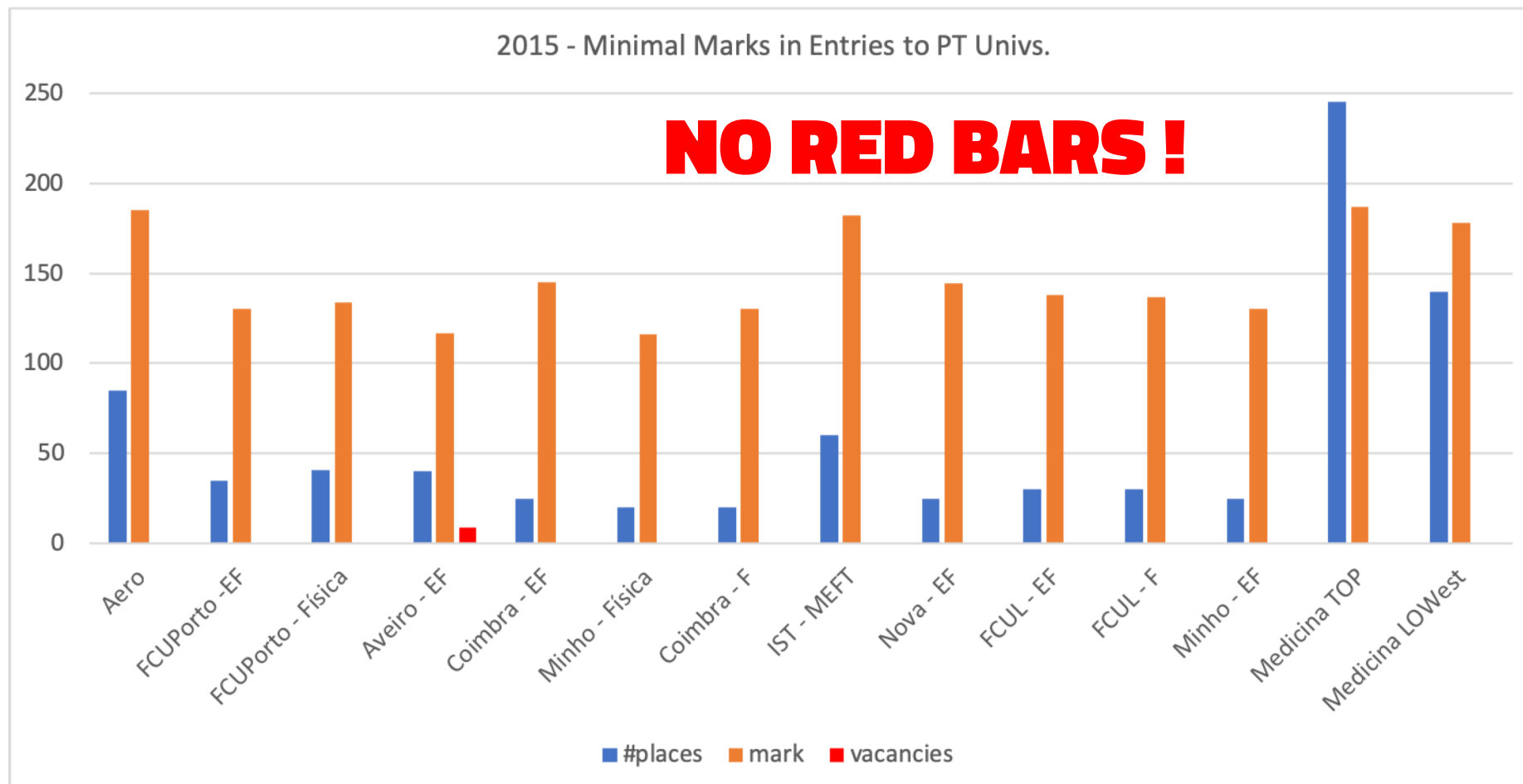
**Several Cloud Chambers built at the schools!**

40+ since 2015

# // Return in the choices of stds.!



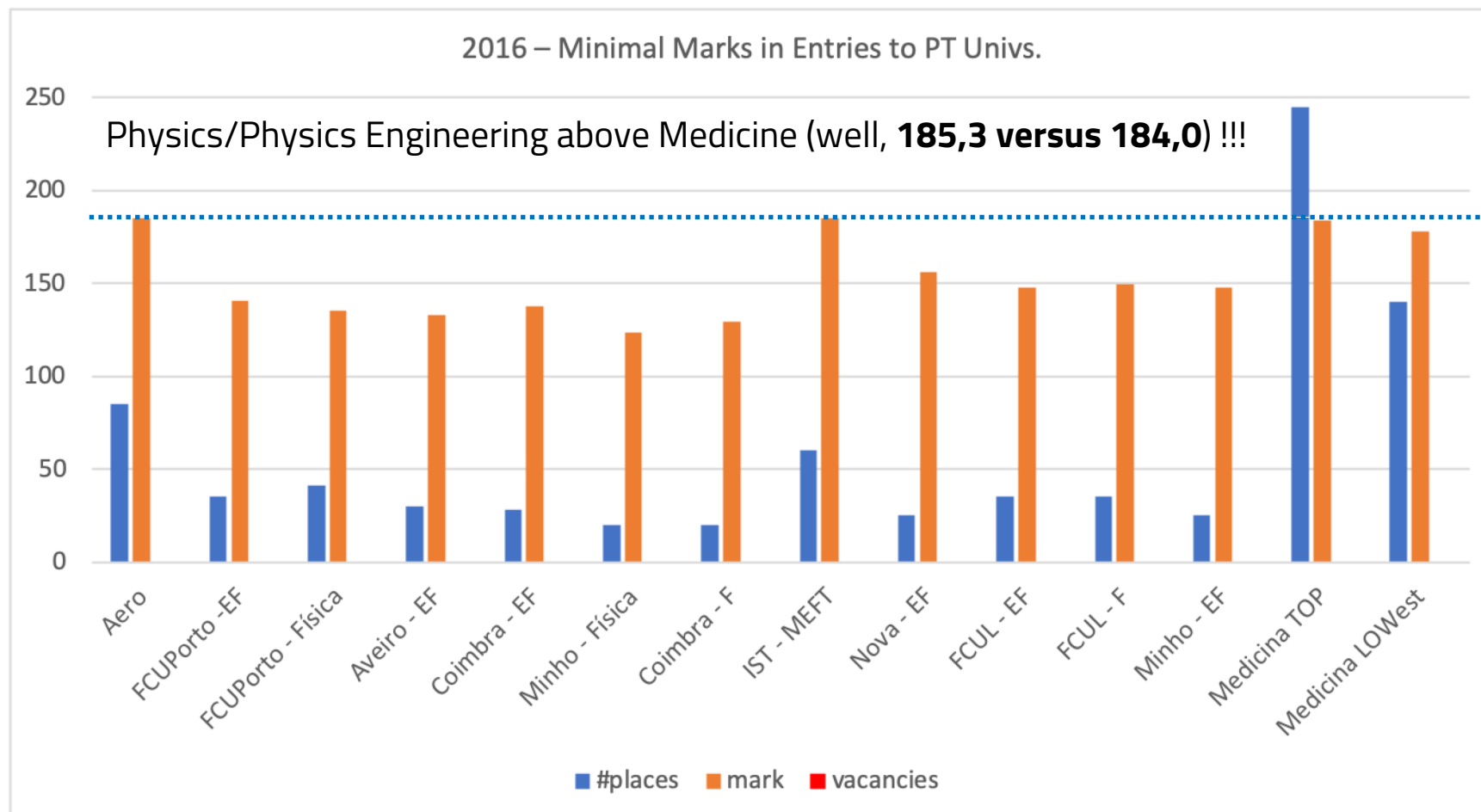
## Turnover in 2015:



# // Return in the choices of stds.!



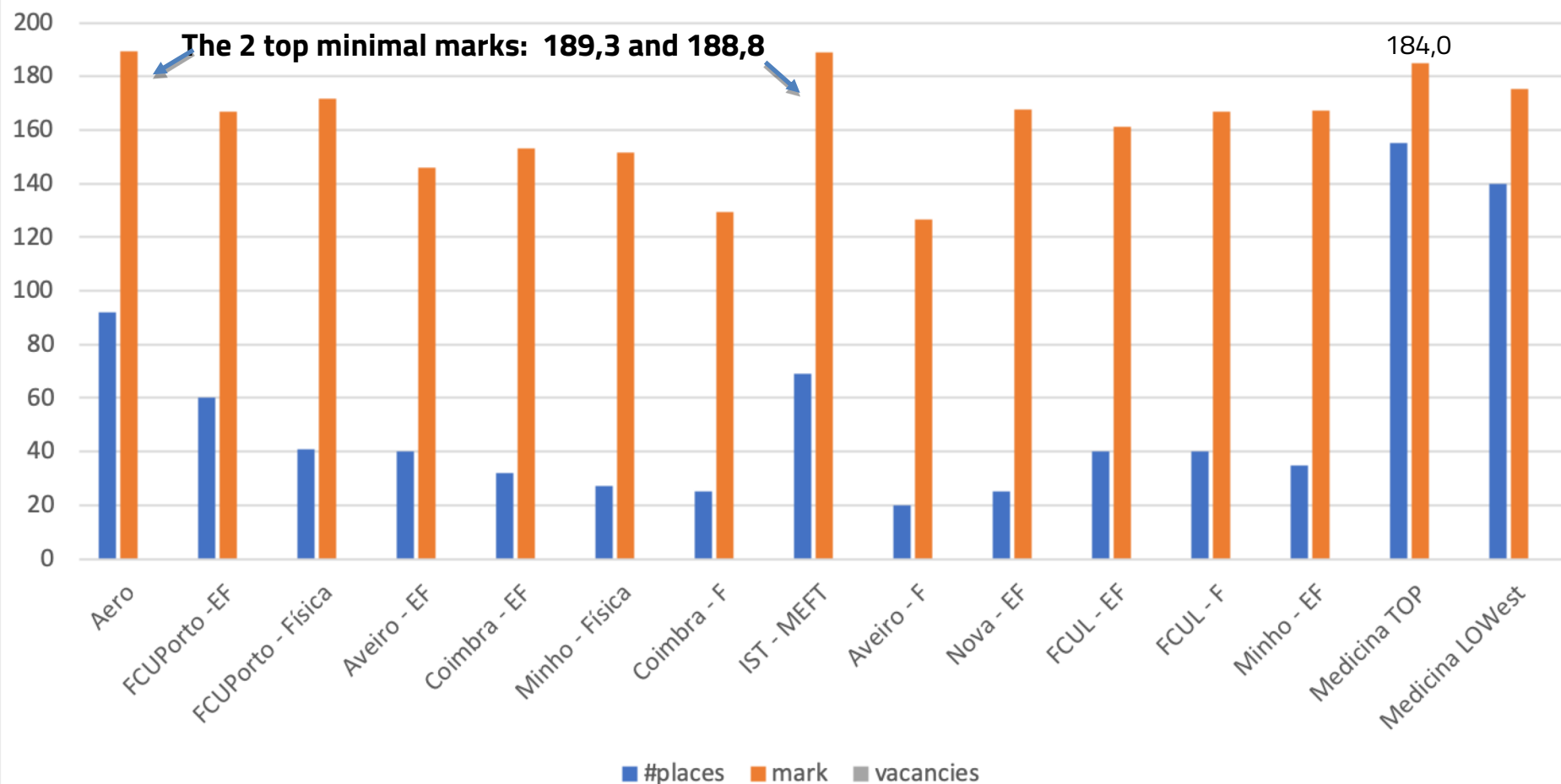
...and “scandal” in 2016:



# // 2019!



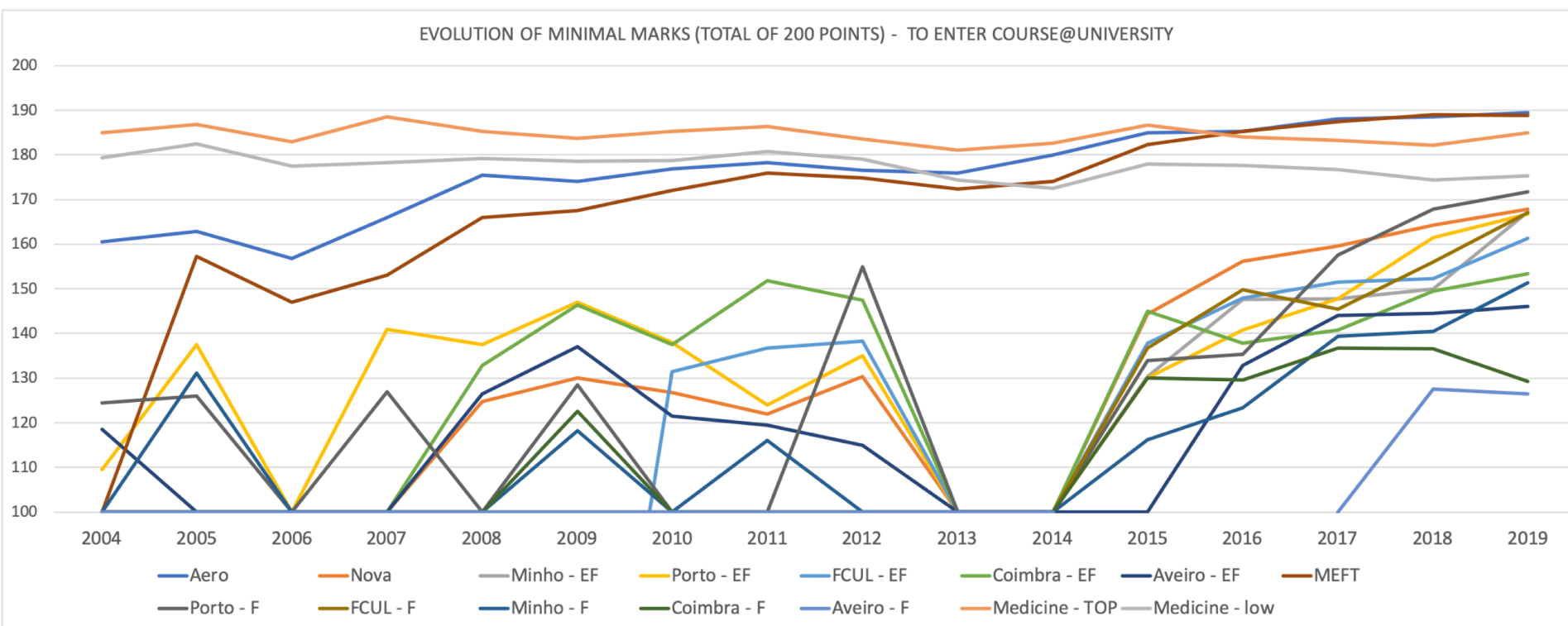
2019 - Minimal Marks in Entries to PT Univs.



# // Return in the choices of stds.!



## Overall Evolution 2004-2019



- Note that different #places in different courses does hinder the minimal mark analysis
- This is also a result of MANY OTHER activities/groups (unrelated to Particle Physics)
- It does payoff to engage, to go to schools, to talk to the young



*Planting  
a future*

# Thanks!

(this is a big thanks!)

to all the people collaborating in all these activities!  
...and for your attention!

## Any questions?

You can find me at [abreu@lip.pt](mailto:abreu@lip.pt)

