

INTERNATIONAL MASTERCLASSES

Nurturing Girls' Interest in Science with Particle Physics Masterclasses

U. Bilow, Technische Universität Dresden

ICHEP 2020, Prague



Overview

What is a Masterclass?

- “Particle physicist for a day”
- Introductory talks
- Lunch with physicists
- Analyze authentic HEP data
- Videoconference

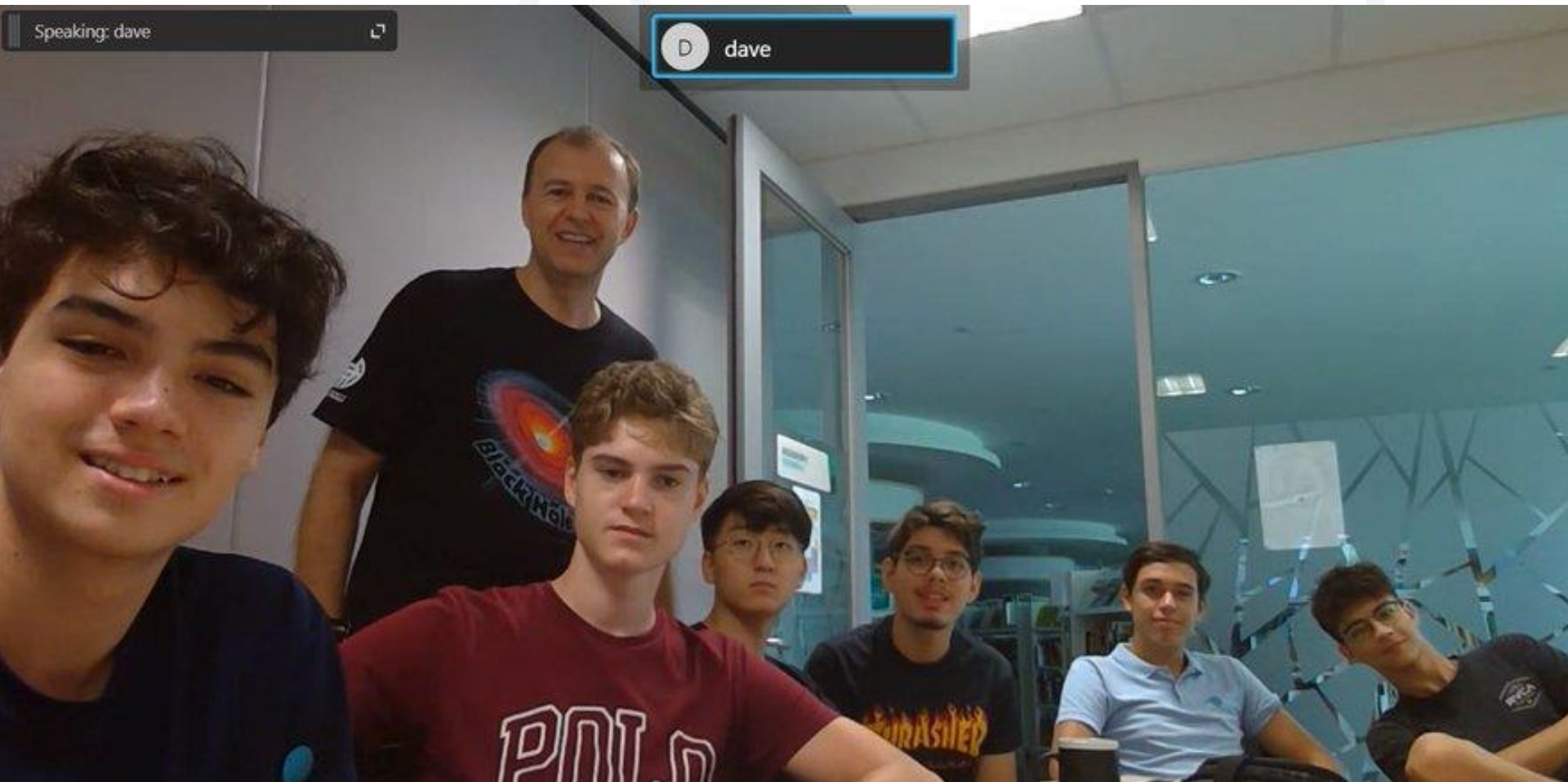
International Masterclasses (IMC)

- 60 countries
- > 220 research labs
- > 10^4 Students
- Videoconferences at CERN, Fermilab, KEK, GSI, TRIUMF
- Organized by [IPPOG](#)

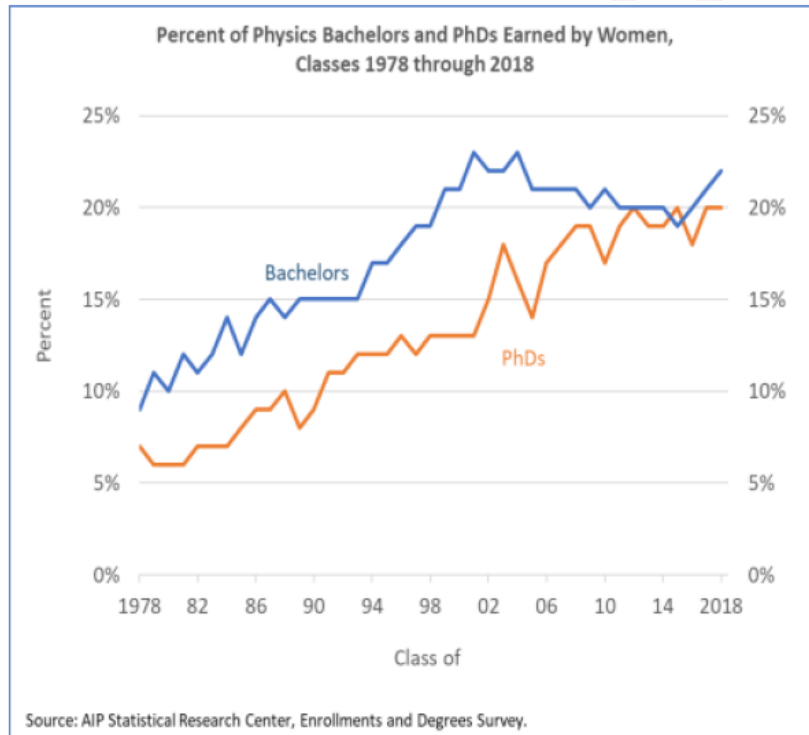
see [talk](#) on IMC from Tue



Our motivation: Inspire the next generation of scientists!



Women are underrepresented in physics



Gender ratios are unbalanced

- Women with physics bachelor: 22 %
- Women with physics PhDs: 20 %

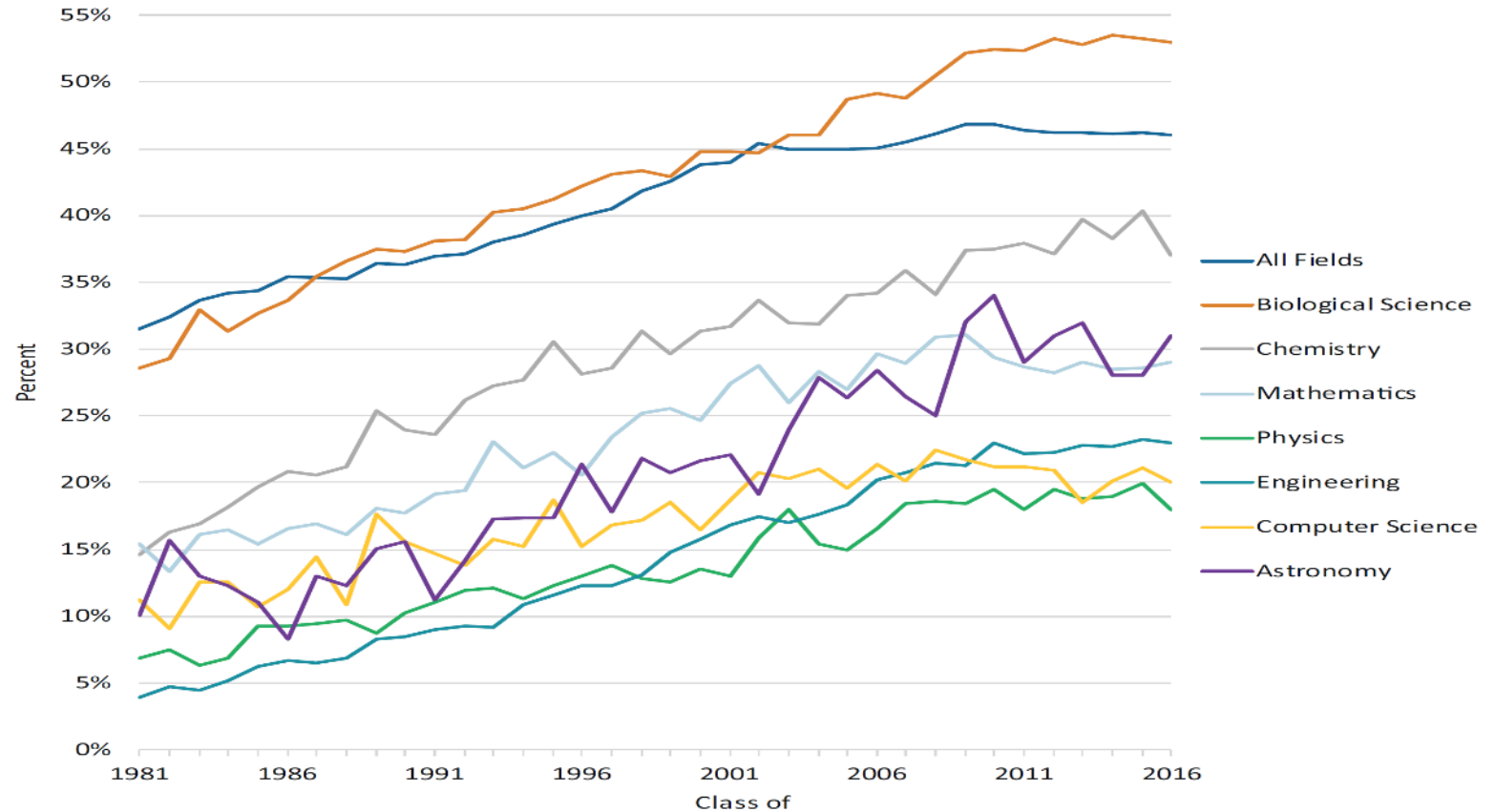
Why?

Complex issue, many factors:

- Physics is viewed by society as hard and difficult
- Social conditioning of boys and girls, which starts early, is detrimental
- Career advice and guidance is crucial

STEM Statistics

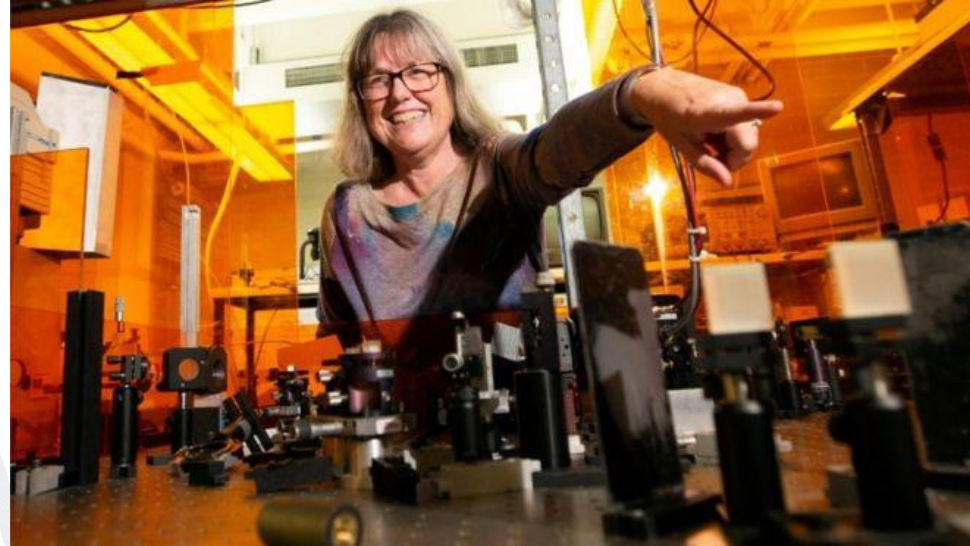
Percent of PhDs Earned by Women in Selected Fields,
Classes of 1981 through 2016



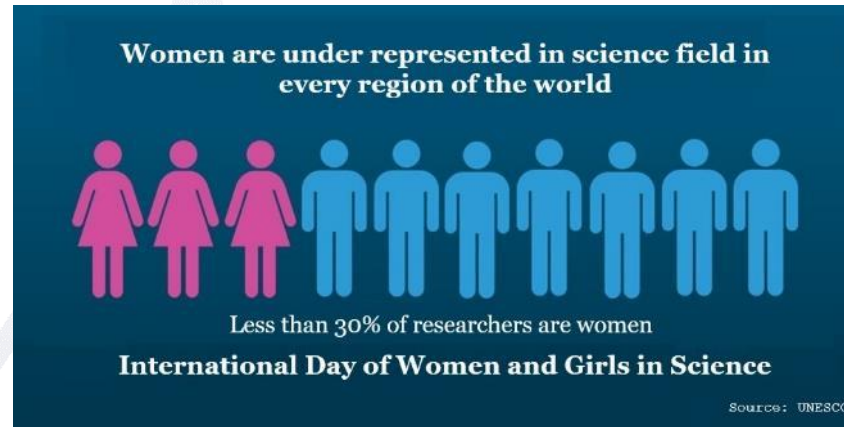
Source: National Science Foundation, National Center for Science and Engineering Statistics. Data compiled by AIP Statistical Research Center.

Just another indicator: Donna Strickland

- Canadian physicist, born 1959
- Nobel Prize for Physics 2018, together with Gérard Mourou, for the invention of chirped pulse amplification
- She did not even have a Wikipedia entry before she received the Nobel Prize!



Intl. Day of Women and Girls in Science









- UN initiative: “gender equality is a core issue”
- Dec 2015: General assembly adopted a resolution → establish an International Day to recognize the critical role women and girls play in science and technology communities
- UN proclaimed Feb 11th of each year the International Day of Women and Girls in Science (IDWGS)
- Aim: Support and promote the access of women and girls to science education and research activities

Particle Physics Masterclasses for Girls

- MCs for girls on IDGWS started in 2017
- Decision at IPPOG meeting in Nov 2016
- Target especially girls (but not exclusively)
- Female lecturers and tutors, as much as possible
- All videoconferences with female moderators
- Offer to all IMC institutes (> 200 worldwide)

→ 10 MC

→ ~ 320 girls

Fri, 10.2., VC1	Fri, 10.2., VC2	Sat, 11.2., VC1	
Paris, APC + <u>U.Diderot</u>	Madrid, CIEMAT	Rio de Janeiro	● ATLAS W
Cosenza	Rio de Janeiro	Heidelberg	● ATLAS Z
<u>Praque</u> , CTU	Cagliari	São Paulo	● <u>LHCb</u>
Barcelona, IFAE			● CMS
Moderators			
 Ina Carli (ATLAS)	 Maria Cepeda (CMS)	 Francesca Dordei (LHCb)	 Mariana Fontana (LHCb)
			 Stefanie Morgenstern (ATLAS)
			 Stefanie Todt (ATLAS)

Program at IFAE Barcelona

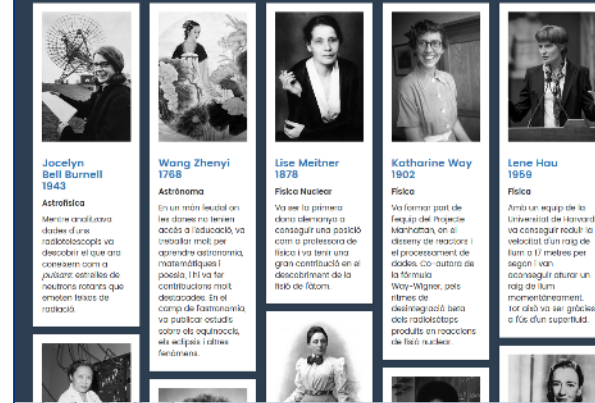
- ATLAS Masterclass with 40 girls
- Visit to the tier-1 data center PIC
- On Saturday: astroparticle Masterclass (Gamma Ray Hunters) for girls



30.07.2020

Uta Bilow, TU Dresden

Moltes dones han fet contribucions crucials a la física fonamental



A l'IFAE les investigadores fan recerca en els temes més candents de la física, des de les partícules fins al cosmos



... in Cosenza

- 30 girls from high-schools + few young university students
- All presentations by female scientists
- Extra talk: Le donne nella ricerca (information on situation of women and girls in science in Italy and around the world)
- „It was a fantastic day!“
- Council of Physics acknowledged 11 February as a special day of the Physics Department dedicated to girls, in agreement with the UN Resolution, for the next years



Impressions from APC Paris

- 24 female high-school students
- 2 young female researchers (PhD student/engineer) introduced themselves to the girls, told about their professional path and joined us for lunch to discuss informally with the participants
- „*The girls were enthusiastic*”
- „*hope to have a chance to participate again in the future*”



... and from CTU Prague

- *“No general understanding in Czech republic that we need to make special action for women or girls → difficult to announce and promote event”*
- 14 girls from high schools + 5 girls from first year of university studying particle physics
- Discussion about gender issues in science
- Tour to silicon detectors laboratory
- Unexpected great attention from media
 - 2 long articles in Czech newspapers
 - Czech public television sent a reporter with a team (TV news at 17:00)



Next edition: 2018

- 8 research labs
- 250 students
- 2 VCs
- 4 female moderators

Ana Godinho (head of ECO) gave a welcoming address

Moderators
Stefanie
and Rosa
(ATLAS)

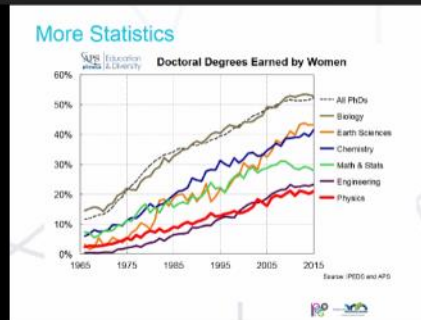
Some
institutes
invited
girls +
boys



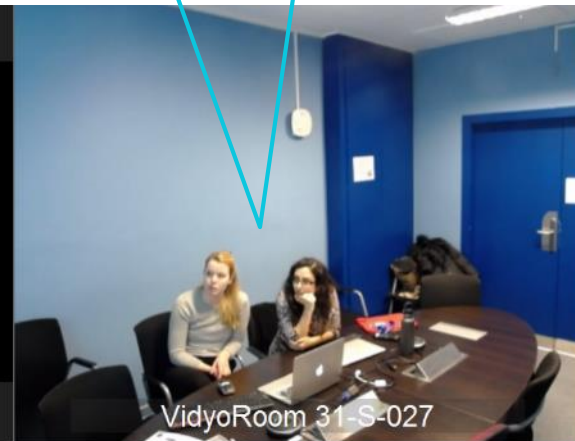
IDWGS 2018

Short presentation
about situation of
women in physics

Moderators Leonora
(CMS) and
Marianna (LHCb)



MC Moderator CERN



VidyoRoom 31-S-027



MC-IFAE-Barcelona-Spain



CIEMAT Madrid Spain



CAGLIARI

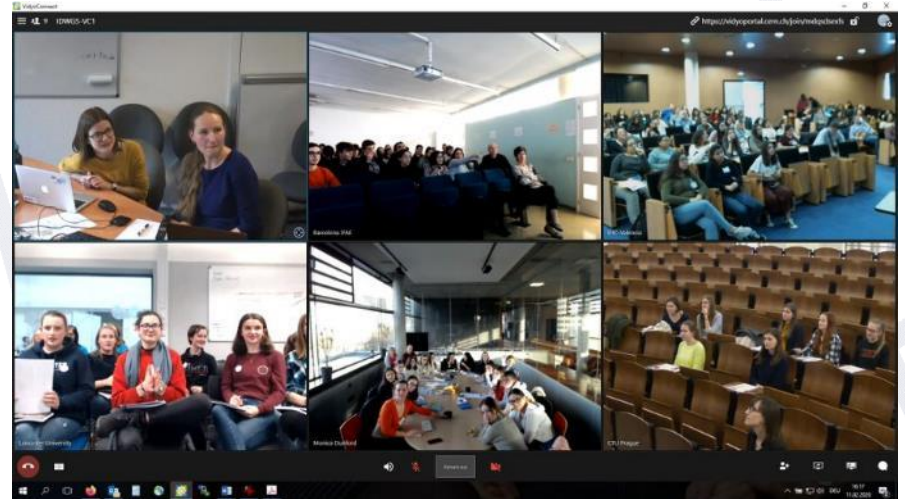
IDWGS 2019

- 11 research labs, 9 girls-only
- 600 students
- 3 videoconferences
- 7 female moderators



IDWGS 2020

- 17 groups participating
- 600 students
- 4 videoconferences at CERN with female moderators, incl. presentation on situation of women in physics



“My institution (Lancaster University in the UK) took part for the first time last Tuesday on the International Day of Women in Science. We hosted a school group, and had a great day - thanks very much!”

Concerns about discriminating boys

- Girls-only events: are they discriminatory to boys?
- Offering the same to everyone does not mean they actually have an equal experience, or an equal chance to participate



- Equality approach does not recognise that people have different needs and starting points
- For many people, being 'treated the same' or 'offered the same' does not mean they actually have an equal experience, or an equal chance to participate.

Thanks to Beth Bramley, IOP, for sharing cartoon and thoughts

Equity approach



- Starts to address some of the structural inequalities
- Recognizes that people are not equal in society.
- Cartoon deals with differences in physical attributes (height, dis/ability)
- Equity approach: e.g. a girls-only event, or requiring 50% girls, or inviting certain individuals to a school trip rather than asking for volunteers, or treating students from disadvantaged groups preferentially
- Although a normal Masterclass is free to access for girls and boys, girls might need extra encouragement

Summary

- International Masterclasses celebrate the UN Intl. Day of Women and Girls in Science on Feb 11
- Masterclasses for and with girls/women are arranged
- Girls can collect positive experience in a research environment and meet role models
- With this activity, IPPOG is nurturing girls' interest in science



Interested to get involved?



Next IDWGS: Feb 11, 2021

More info:

Girls Masterclasses: <http://cern.ch/go/h8XN>

International Masterclasses: www.physicsmasterclasses.org

Contact: uta.bilow@tu-dresden.de