

Ecole Internationale Daniel Chalonge-Héctor deVega

Science with great intellectual endeavor and a human face



**La Science qui donne envie
Une grande aventure scientifique et humaine**

***30 Years of Activity. Calling for Understanding
Open and Free Science - Open and Free Access***

Welcome to the Chalonge – de Vega School:

**A Laboratory of Ideas, Research, Training
and Scientific Culture**

***A beacon at the forefront of physical cosmology
and astrophysical physics with novel scientific
research, projects and ideas, international
collaboration and careful interdisciplinarity, with
both Theory and Observations***

***Open to researchers, post-docs, advanced students
of different disciplines in the field, both theorists,
experimentalists, observers. Open to specialists
and non-specialists in the field, as well as to
teachers, communicators, journalists.***

<https://chalonge-devega.fr/>

PROGRAMME 2021
OPEN SCIENCE AND IN FREE ACCESS
SCIENCE OUVERTE ET EN LIBRE ACCES

In remote 16h00 PARIS TIME

THURSDAY 21 JANUARY 2021

Prof. Dr Carlos O. LOUSTO' (Professor at RIT -
Rochester Institute of Technology- School of Mathematical
Sciences, Co-Director of the Center for Computational
Relativity and Gravitation, Rochester NY):

*From simulations of binary black holes to insights
into astrophysics and gravitational waves*

THURSDAY 28 JANUARY 2021

Prof. Dr Gérard 'T HOOFT, Nobel Prize in Physics,
Professor at the Institute for Theoretical Physics,
Utrecht University and Spinoza Institute:

Quantum Black Holes

WEDNESDAY 3 FEBRUARY 2021

Prof. Dr Reinhard GENZEL, Nobel Prize in Physics,
Director at the Max-Planck-Institut für
Extraterrestrische Physik, Garching:

A Forty-Year Journey

WEDNESDAY 10 FEBRUARY 2021

Prof. Dr Barry C. BARISH, Nobel Prize in Physics,
LIGO Caltech Laboratory, LSCEC, California
Institute of Technology, Pasadena:
Gravitational-Wave Detections

THURSDAY 4 MARCH 2021

Prof. Dr Didier QUELOZ, Nobel Prize in Physics,
Professor at the Cavendish Laboratory-
Astrophysics, Cambridge UK and Geneva University
Exoplanets Research

THURSDAY 8 APRIL 2021

Prof. Dr John C. MATTER, Nobel Prize in Physics
and Chalonge Medal, NASA-Goddard Space Flight
Center, Cosmology, JWST SPS, Greenbelt

*Getting JWST ready, what it can do.
New observational techniques for adaptive optics
using orbiting laser guide stars. Wouldn't it be
great to have nearly perfect imaging at visible
wavelengths with the ELT?*

Next Lectures in this Programme:

Prof. Dr Adam RIESS

(Nobel Prize in Physics, Chalonge and de Vega Medals).

Prof. Dr Brian SCHMIDT

(Nobel Prize in Physics, Chalonge Medal).

Prof. Dr George SMOOT

(Nobel Prize in Physics, Chalonge Medal)

And Other LECTURERS

to be announced along the year...

Free registration at:

<https://chalonge-devega.fr/Programme2021.html>

contact: [chalonge.ecole at chalonge-devega.fr](mailto:chalonge.ecole@chalonge-devega.fr)

"Et ce n'est pas tout...." (Citation d'Henri Poincaré)

And other events to be announced along the year...

Programme 2021:

<https://chalonge-devega.fr/Programme2021.html>

Scientific support to the Programme 2021:

<https://chalonge-devega.fr/Programme2020.html>

Daniel Chalonge and Héctor de Vega Medals

Awarded Medals:

Subramanyan CHANDRASEKHAR, Nobel Prize of Physics.

Bruno PONTECORVO.

George F. SMOOT, Nobel Prize of Physics.

Carlos FRENK

Anthony LASENBY.

Bernard SADOULET, Fellow of the USA Acad of Arts &Scs

Peter BIERMANN.

John C. MATHER, Nobel Prize of Physics.

Brian SCHMIDT, Nobel Prize of Physics.

Gérard GILMORE, Fellow of the UK Royal Society.

Héctor J. DE VEGA.

Nicholas KAISER, Golden Medal of the UK Royal Society.

Adam G. RIESS, Nobel Prize of Physics.

Héctor DE VEGA,
the Scientist and the Human person
<https://chalonge-devega.fr/HdeV.html>

Scientific News, School Courses,
on line Lectures, Films, Albums of Pictures,
Archives Chalonge de Vega Sanchez:
<https://chalonge-devega.fr>

Science Organization and Correspondents:

Norma G. SANCHEZ, Maria C. FALVELLA, Alba ZANINI,
Diego J. CIRILO, Marina RAMON MEDRANO, Annalisa
PERISSA TORRINI, Helios JAIME, Pierre ROCHUS, and
other colleagues...

Engineering Support:

Djilali ZIDANI, François SEVRE, Emmanuel VERGNAUD,
Jérôme BERTHIER, Marie PLANCHOT,
and other colleagues....



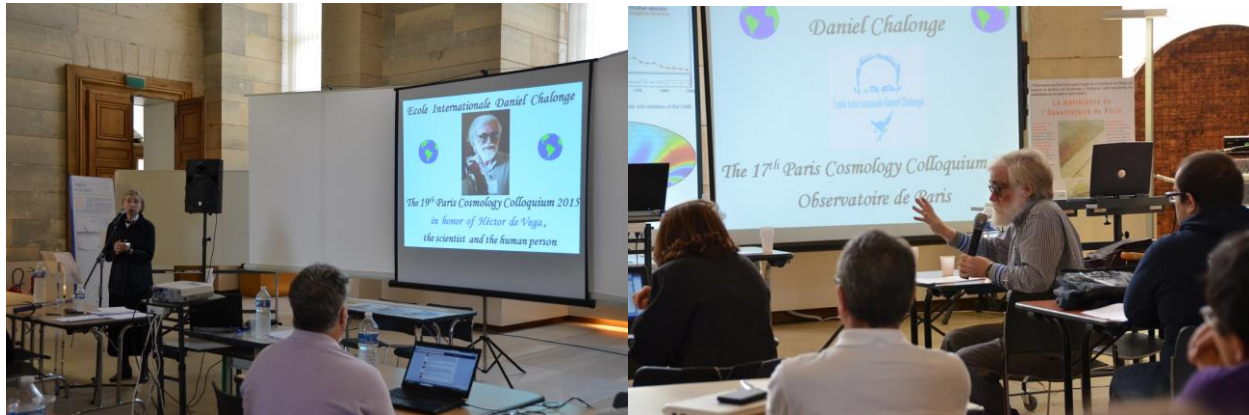
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**The Chalonge School, a laboratory of ideas
a great scientific and human adventure**





The Daniel Chalonge Medal and the Héctor de Vega Medal, a surprise award.



The list of the awarded Chalonge Medals :
1991: Subramanyan Chandrasekhar,
Nobel prize of physics.
1992: Bruno Pontecorvo.
2006: George Smoot, *Nobel prize of physics.*
2007: Carlos Frenk.
2008: Anthony Lasenby.
2008: Bernard Sadoulet.
2009: Peter Biermann.
2011: John Mather, *Nobel prize of physics.*
2012: Brian Schmidt, *Nobel prize of physics.*
2013: Gerard Gilmore.
2015 : Héctor de Vega.



2018: Nicholas Kaiser.
2020: Adam G. Reiss, *Nobel prize of physics.*
2021:



PARIS - MEUDON COLLOQUIUM

22 - 26 SEPTEMBER 1986

Archives Sanchez de Vega

Colloque pionnier de 1986: "String Theory, Quantum Gravity and Quantum Cosmology, Integrable and Conformal Invariant Theories"

En bas: Norma Sanchez, Jane Wilde Hawking, Stephen Hawking, une assistante.

En haut à gauche: Héctor de Vega, à son côté Jean-François Augereau (journal Le Monde).

Moitié droite: Gary Gibbons, Chris Pope, Kellogg Stelle, Stanley Deser, J. Harnad, Helmut Rumpf, Tom Curtright, Jean Heidmann, Paolo Di Vecchia, Vladimir Rittenberg, Bernard Whiting, ..., Dieter Maison, J-Pierre Antoine,... Peter Aichelburg, Gerhard Schafer, P. Ruback, Don Page, E. Corrigan,... M. Umezawa,..., J. Kijowski, Michael Karowski, Karl Rehren

Moitié gauche: Renato Musto, Jean Avan, un assistant de Stephen Hawking, Charles Nash,..., Carl Bender,..., Roberto Pettorino, Jan Moss, Antonio Segui, David Olive, Ulf Lindström, Holger Nielsen, Antoine Van Proeyen..., Robert Pisarski, Hugh Osborn, M. Costa, Anne Magnon, Claudio Destri...., Héctor de Vega, Jean-François Augereau.

....Parmi les participants et conférenciers du colloque absents sur la photo.... John G. Taylor, François Englert (prix Nobel de Physique 2013), Claude Itzykson, Jean Lascoux, Pierre Fayet,...



Inauguration of the Chalonge School : First course on Astrofundamental Physics, septembre 1991.

De gauche à droite et de bas en haut: Turner, Mme Chandrasekhar, Chandrasekhar, Sanchez, Smoot, Khalatnikov, Einasto, Divan, Pontecorvo, Turok, Frenk, Kibble, Fehrenbach, De Greiff, Lousto', de Vega, Stompor, Cayrel, Mollerach, ...Nusser, ..Amendola,, Mme Ferenbach, Jaffe, Müller, Giovannini, Taylor, Haxton, Hua, Astone, Dressler, Pizzella, Gabriele, Joffe, Dettki, Jaffe, Muriel, Bertschinger, Ormes, Grishusuk, Hearnshaw, Easter, Sadoulet, Silk, Roulet, Harari,,,, hors champ: Audouze, Bergmann et Mme, Fang Li Zhi, Richards, Schatzman, Weber,.....



Chalonge School 2nd course on Astrofundamental Physics, septembre 1992 De gauche à droite et de bas en haut: Bergmann, Hogan, Dekel, Lynden-Bell, Frenk, Smoot, Sanchez, Pontecorvo, Israel, Kolb, Schramm, Ramond, Fishman, Lousto', Campanelli, Mme Bergmann, Mosconi, Falvella, Signore, Bottinelli, Gouguenheim, de Vega, Khalatnikov, Vittorio, Lasenby, Shapiro, Weekes, Salopek, Schmid, Grabar, Pontecorvo Jr, Einasto, Dubrovich, Boyanovsky, Parijskij, Prokopek, Peltoniemi, ..., Dettki, Levinas, Magueijo, ,,., ., Nicolaidis, Brandenberger, Giovannini,Copeland, ..., Blumenfeld, Gottlöber, Hartman, ..., Muriel, Kogut, Grindlay, ...Cappozziello,,,, Donzelli, Easter,,,, hors champ: Rowan-Robinson, Frolov, , Danzmann, Schönfelder,



En haut: July 2010 Paris. En bas: July 2013 Paris: Les participants dont trois lauréats du prix Nobel de Physique en Cosmologie 2006-2012, et six médailles Chalonge, réunis sur la méridienne de Paris.



<https://chalonge-devega.fr/>
<https://chalonge-devega.fr/HdeV.html>

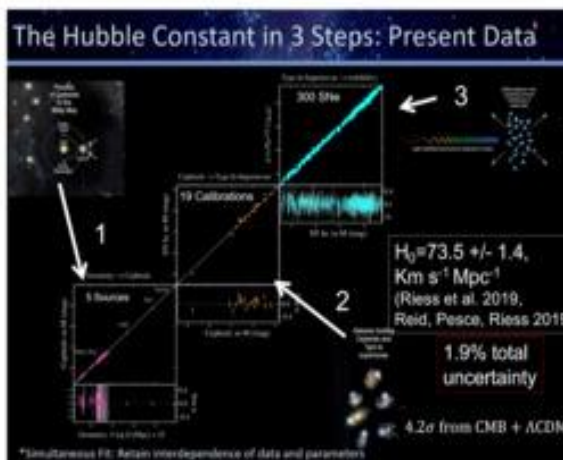
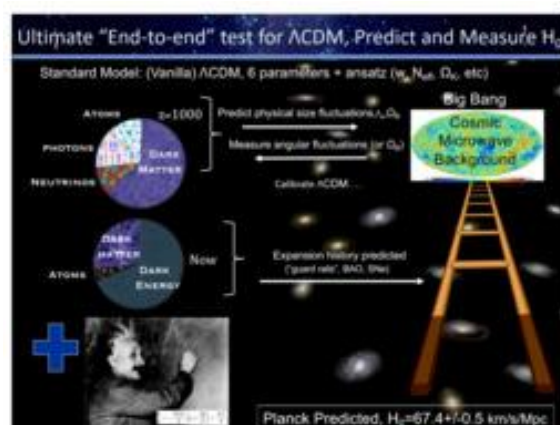


Dr. Adam Riess

Johns Hopkins University
Space Telescope Science Institute

**NEW MEASUREMENTS OF THE
EXPANSION RATE OF THE UNIVERSE,
FASTER THAN WE THOUGHT**

SH₀ES Team



Next Steps: Increasing Number of SN-Cepheid Calibrations

"NEW" SHOES Large HST Programs, Cycles 25,26,28
 24 more Cepheid-SN Ia Calibrators underway,
 to reach total=43, + Cepheids to Coma!



Can We Believe Measurements without Explanation?

Don't sweep "problems" under the rug

"Problems" are often clues!

- Precession of Mercury **Solved!**
- Solar Neutrino Problem **Solved!**
- Missing Baryon Problem **Solved!**
- Lithium Problem
- CMB Cold Spot
- Flat rotation curves/ what/where is dark matter?
- Accelerating Universe/ why Λ so small?

Future Prospects...

Survey	Now (%)	Future (%)
SN Ia	4.8%	74.2%
SN Ib/c	3.3%	73.8%
SN II	2.4%	73.2%
SN Ia+Ib/c	2.2%	73.8%
SN Ia+Ib/c+II	1.9%	73.5%
SN Ia+Ib/c+II+Ia+Ib/c	1.5%	72.5%
SN Ia+Ib/c+II+Ia+Ib/c+II	1.2%	72.2%

- New low-z SN samples
- Doubling SN Calibrator sample, 19→40
- Gaia EDR3 !!!
- LIGO H_0 (Late Universe)
- DESI, LSST, WFIRST, Euclid → better $w(z)$
- Next generation CMB: signatures (e.g., EDE)
- Stay tuned...

Final Thoughts

- Discrepancy is $\sim 5\sigma$ (4-6) σ (depending on combination)
No Late Universe measurements lower than any Early
- Appears robust, requires multiple catastrophic failures to avoid
- Very interesting! (unless your Bayesian prior on Λ CDM $> 5\sigma$)
- Feign No Hypothesis, let's follow evidence, find the *how*
- Universe may be more clever than we are now

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