

... is generated by the similarity $A_{\infty} \rightarrow A_{p,q}$

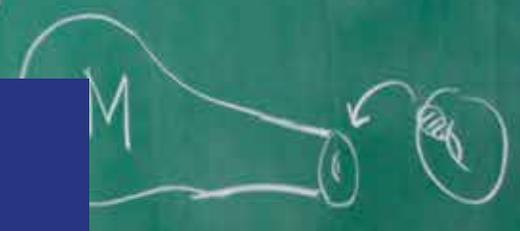
$$\mathbb{Z}(p,q) \oplus \mathbb{Z}(p,q) = \mathbb{Z}^2$$

(B): quotients of models other than H^3 and S^1 are Seifert fibered

... is a compact hyperbolic 3-manifold called the (p,q) -Dehn filling of M

(...): if M is a 1 -cusped but ∞ -many Dehn fillings are isometric thick part if

Killing the slope (p,q)



IHES,
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OF SCIENCE

(...): under a given volume, \exists only ∞ -many topological types of thick parts of hyp. 3-folds.

(...): volumes of hyp. 3-manifolds is well-ordered, of type

A CAMPAIGN SUPPORTED BY THE FRIENDS OF IHES





THE INSTITUTE IS A PARADISE FOR SCIENCE

“Fundamental research is the cornerstone of so much of contemporary science and society. IHES provides mathematicians and physicists with a place where they can dedicate themselves to their research activities.

Quite simply, the Institute is a paradise for science. Located on the outskirts of Paris, scholars are at total liberty to explore new ideas in an environment that combines beautiful surroundings with optimal work spaces. Recognized as one of the finest institutions of its kind in the world, IHES is able to attract the very best visiting academics.

Investing in the future to remain in the *Avant-Garde* of science is vital and the Friends of IHES in the United States and beyond will continue to support this vital cause.”



Michael R. Dole

Theoretical Physicist, Chairman
and President of Friends of IHES

PICTURE: MARILYN AND JAMES SIMONS CONFERENCE CENTER

IHES, AT THE AVANT-GARDE OF SCIENCE - THE THIRD CAMPAIGN OF IHES
REALISATION: IHES, 2020
PHOTO CREDITS: IHES/FD, IHES/MCV



BACK TO ITS ORIGINS

The story of the creation of IHES leads straight to the USA: Léon Motchane, its founder, took his inspiration from Robert Oppenheimer who supported his idea of creating in Europe a **new research center mirroring that of the Institute for Advanced Study in Princeton.**



IHES, A UNIQUE MODEL

IHES is a private and not-for-profit advanced research institute in mathematics, theoretical physics and all related sciences, founded in 1958 in France. The Institute offers exceptional scientists a place where they can devote themselves entirely to their research. At the heart of the IHES community are the Institute's Permanent Professors, first-rate scientists appointed for life, around whom revolves a larger group of around 200 visiting researchers each year.

OUR KEY VALUES



Independence and freedom in research

Permanent and Visiting Professors are completely unfettered from teaching duties and administrative responsibilities or concerns.



Courage and risk taking

IHES stands apart by its daring recruitment policy; not content with attracting those with established scientific reputations, the Institute bets on young talents.



Collaboration and emulation

Anchored by the permanent professors, the intellectual life of the Institute is constantly stimulated and invigorated by a program of seminars, conferences and meetings, which attract scientists from Paris region and the world.



Intellectual curiosity and ambition

IHES provides the supportive environment needed for fundamental science at the highest level which necessarily relies on long-term research work.



MY VISION OF AN EXCITING FUTURE FOR IHES

From the recruitment of Grothendieck at the foundation of IHES, to the recent creation of post-doc positions, IHES is about outstanding personalities rather than predefined outcomes. By investing in the right people and giving them the complete freedom to follow their curiosity, we believe IHES will continue to play a key part in adding to the sum of worldwide knowledge.

Our campus is exceptional but we must reexamine the logic of the space: upgrade our office capacity with the increase in the number of researchers and events, invest more in common spaces and engage in a more sustainable renovation.

Endowing IHES to secure its financial future is critical, now more than ever. We must make further progress towards independence.

This campaign, the third in the history of IHES, has a partnerships and fundraising goal of **\$60 million**. I am committed to fully realizing that objective and invite you, our community all across the world, to join our new campaign:

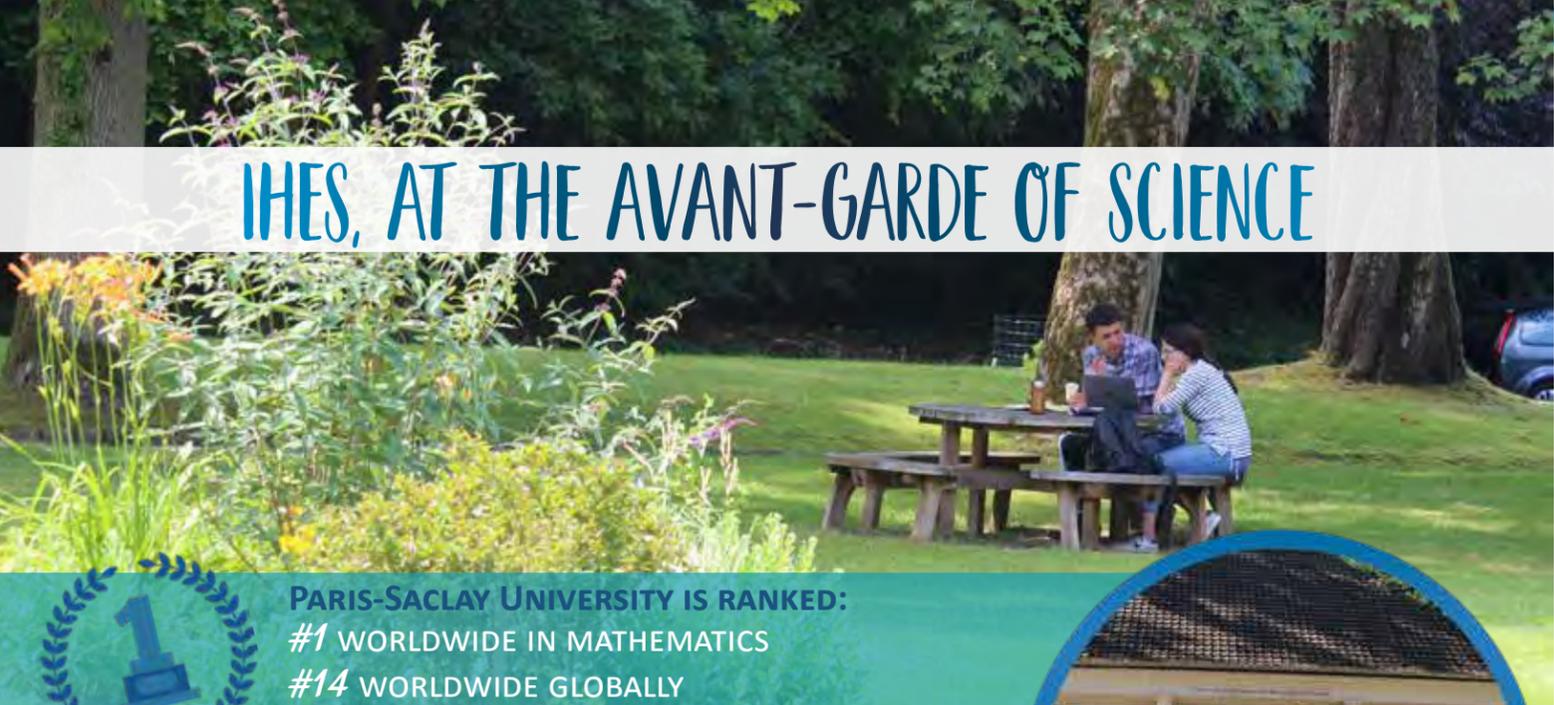
"IHES, at the Avant-Garde of Science"

Emmanuel Ullmo

Mathematician & Director of IHES



IHES, AT THE AVANT-GARDE OF SCIENCE



PARIS-SACLAY UNIVERSITY IS RANKED:
#1 WORLDWIDE IN MATHEMATICS
#14 WORLDWIDE GLOBALLY
 in Shanghai Jiao Tong's Academic Ranking of World Universities (2020)



PEOPLE

 **\$30 MILLION**

Support scientists that transcend the boundaries of understanding

 **Supporting the Permanent Professors**
 The Institute's permanent professors constitute the Institute's DNA. Our aim is to raise the number of positions from 6 to 8, an unprecedented increase since the 1970's.

 **Providing early-career opportunities**
 IHES wants to create Junior Positions in order to recruit top-level, very promising, young researchers.

 **Creating more Triennial Chairs**
 Triennial Chairs allow for longer visits over a 3-year period to favor long-lasting collaborations.

 **Reinforcing the visiting program**
 The Institute's model relies on welcoming researchers from around the world who enjoy a visit entirely dedicated to science and collaboration.

 **Hiring postdocs**
 Increasing the number of post-doctoral positions remains a priority of IHES' scientific program.

 **Aiming for diversity**
 Diversity is one of the main goals of IHES. Our ethical charter sets the guidelines to progress on that aspect.

 **\$6 MILLION**

Help us build a place that reflects our ambitions



Le Bois-Marie

The "Bois-Marie" site is home to both scientific research and the support services that make that work possible. Facilities include individual offices, meeting rooms, a library, lecture halls and a scientific secretary. The Institute must invest to continue to offer an optimal research environment.



L'Ormaille

With 50 units to host visiting professors, as well as their families, from all over the world, the residence "l'Ormaille" is a fundamental asset for IHES that needs to be preserved for decades to come.



PLACE

PERPETUITY

 **\$24 MILLION**

Invest in the future of scientific research



Endowment

Only by securing its long-term future will the Institute succeed in realizing its full potential and flourish. Endowments currently finance 18% of the operational budget, a very significant proportion in the French context, but IHES is determined to go further in its quest for independence. Friends of IHES is fully involved in this strategy and intends to set up an endowment in the US to that end.



IMPACT STORIES



The Marwan and Alix Lahoud Building

The Institute unveiled the Marwan and Alix Lahoud Building during IHES' 60th Anniversary in 2018. The support of Marwan Lahoud, Chairman of IHES, and his wife Alix, after whom the building is named, has been particularly significant in the completion of the project.

Until then the steady increase in scientific research activity over the last 35 years has not been matched by a growth in the Institute's office space. The 350 sq m Alix and Marwan Lahoud Building provides a much needed and welcoming environment for permanent professors, post-doc Fellows, and visiting professors, comprising 13 offices and one common space.

The Alix and Marwan Lahoud Building was inaugurated in November 2018 in the presence of the French Minister of Higher Education, Research and Innovation.

"My wife and I are convinced that the mission of IHES must be sustained, and we are proud that our names are now associated with the Institute's excellence."

Marwan Lahoud,
Chairman of IHES



© Ville de Bures-sur-Yvette

The Nokia Bell Labs Fund

Nokia Bell Labs joined IHES' Campaign in late 2017 by endowing a fund for mathematical research. This partnership for excellence enables visiting professors from all over the world to visit IHES and exchange ideas with their peers.

Emmanuel Ullmo said: *"The Institute welcomes links with the corporate world and the support of Nokia Bell Labs is a perfect demonstration of the continuum between fundamental and applied research."*

"Today at Bell Labs, we are thinking and building the digital platforms of tomorrow, those that will link the physical world to the virtual world, those that will hopefully contribute to the harmonious development of the world. But we know that we must keep the long timescale, the serenity, the curiosity and the freedom that prevail in any great discovery. And this is undoubtedly what guided us in our partnership with IHES."

Jean-Luc Beylat,
Nokia Bell Labs France President



The Alexandria Figueroa and Robert Penner Chair

Triennial Chairs enable IHES to attract eminent scholars of international reputation for extended periods of research at the Institute. They enjoy total freedom to follow their curiosity in an optimal environment for creativity and debates.

Funded in 2018, the Alexandria Figueroa and Robert Penner Chair is the first endowed Chair supported by a visiting professor, mathematician Robert Penner, who pays tribute to his partner through the Chair endowed in their names.

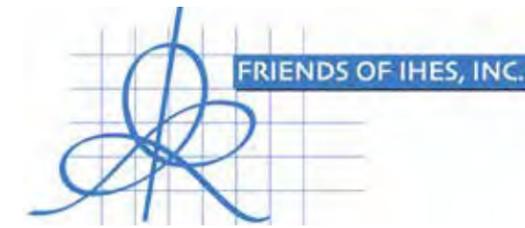
"I am a great believer in the Institute's mission and am pleased to have associated our names with IHES."

Robert Penner,
Mathematician



FRIENDS OF IHES AND IHES

warmly thank the organizations and individuals that are already committed to the "IHES, at the *Avant-Garde* of Science" Campaign



> €10,000,000

Simons Foundation

€5,000,000 - €9,999,999

Huawei Technologies France

€1,000,000 - €4,999,999

BNP Paribas
Alix & Marwan Lahoud
Caisse des Dépôts et Consignations

€250,000 - €499,999

Margaret and William R. Hearst III Foundation
Robert Penner
Nokia- Bell Labs

€100,000 - €249,999

Klaus Tschira Foundation
Florence & David Faucon
Barbara Amonson & Vincent Della Pietra
IBM
Institut Pierre Lamoure

€50,000 - €99,999

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€25,000 - €49,999

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View full list of the Campaign donors on Friends of IHES and IHES websites



"IHES is about much more than math. It is about great minds pushing the frontiers, about people who help us understand the abstract of our everyday life. The Institute has always been of outstanding quality and it is thus a pleasure for us to support this Campaign."

Marilyn and Jim Simons
The Simons Foundation

Friends of IHES, Inc. is a charitable 501 (c) (3) organization created in 1999. Its primary goals are to increase the visibility of IHES in the United States, coordinate a network of current and former American visiting researchers to the Institute, and raise funds for IHES.

G O V E R N I N G B O D Y



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Chairman and President



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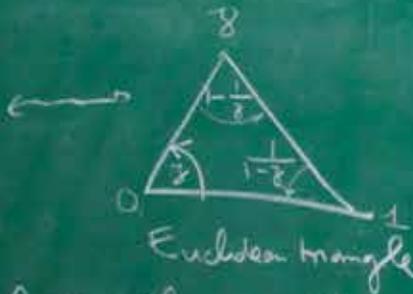


EMMANUEL ULLMO
Ex Officio

more information: info@friendsofihes.org
or contact Claire Lenz, Director of development and communications:
claire.lenz@ihes.fr

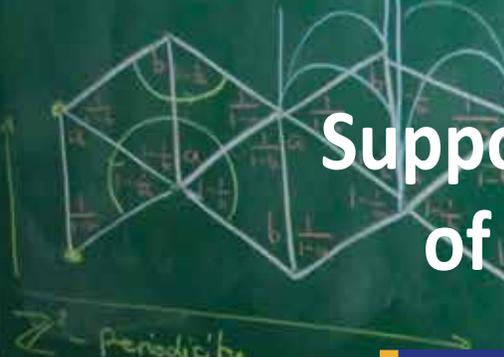


Ideal tetrahedron



Euclidean triangle

Write all labels into the cusp tiling:



THM: (1) than all (with near

Support the advancement of research and join

IHES,
AT THE
Avant-Garde
OF SCIENCE

$(1-\frac{1}{2})^2 a(1-\frac{1}{2})^2$
 $(a-2+2i)(b-2+2i)$

$a=b=e^{i\pi/3}$ is a solution (defining H^+ structure)
(Other vertices yield the same constraint again)

What about nearby solutions to $*$?

THM (Thurston)
COR. the set of



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