GEN IV International Forum

Expertise | Collaboration | Excellence

GIF Education and Training Working Group's Activities

Chair: Patricia Paviet, Co-Chair: Konstantin Mikityuk

Members (14) in alphabetical order:
Beaumont, Heather; De La Chevrotiere, Antoine; Fratoni, Massimiliano; Harrison, Grace; Hwang Il, Soon; Kim, Hyeon-Jin; Kulikov, Evgeny; Latge, Christian; Liu, Xiaojing; Matsuba, Kennishi; Mikityuk, Konstantin; Paviet, Patricia; Shwageraus, Eugene; Sun, Jun;

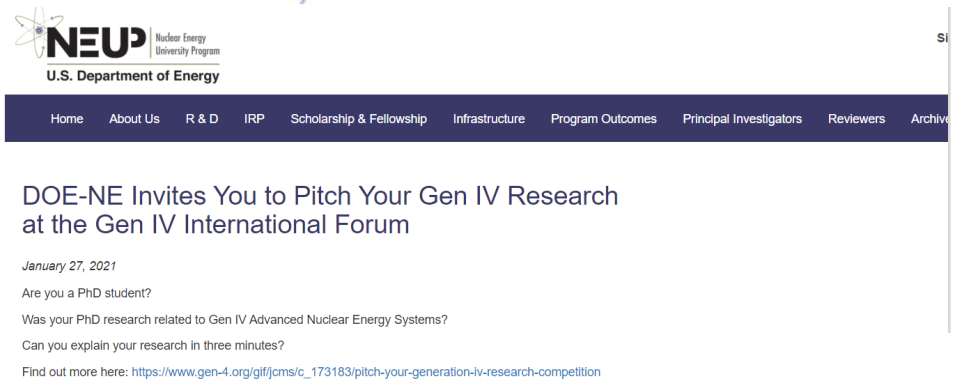
Extracted from Virtual GIF 45th Expert Group and 51st Policy Group Meeting material, 17-21 May 2021

PNNL-SA-162274

Patricia Paviet
Group Leader at Pacific Northwest National Laboratory - PNNL
2mo

#nuclear #cleanenergy #leadersoftomorrow
Pitch your Gen IV Research Competition is open until 28 February 2021 to submit your executive summary (750 words).
https://lnkd.in/gzWBNVR

Winners will be announced in May 2021.
The first-place winner in the GIF Jury Category will be:
(1) invited to present a webinar in 2021 as part of the GIF Education and Training Working Group webinar series, and
(2) invited to attend the next GIF Symposium planned in 2022 (travel expenses will be reimbursed on the OECD NEA basis).



20 JAN to 01 FEB- Lauch website/Send advertisement (Postcard)

01 FEB to 28 FEB Website open for abstract submission

2/28/2020 Website Closed -

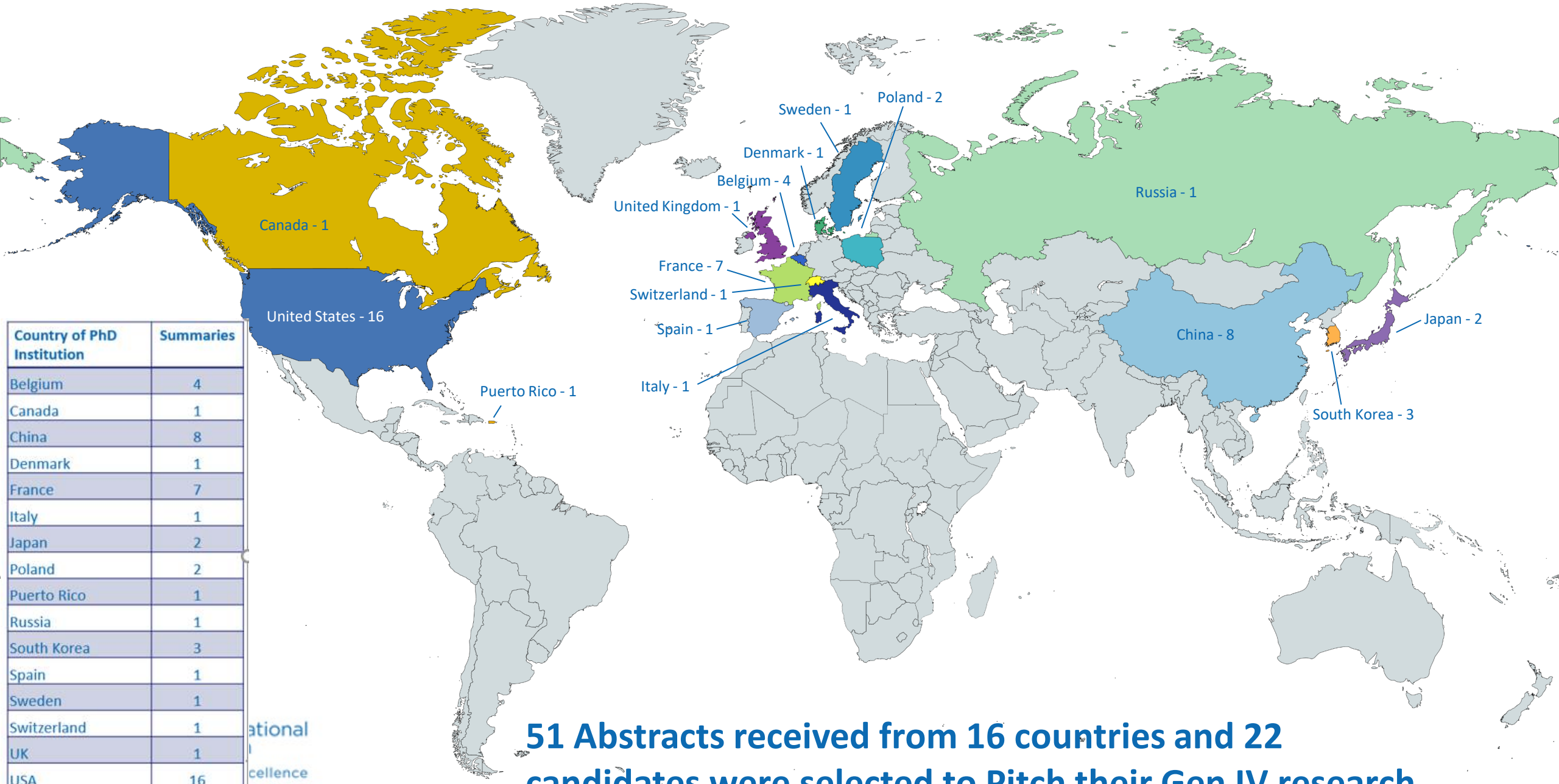
Statistics – 51 Abstracts received

Total number of summaries	51
Students	38
Postdoc	6
Researcher/engineer	7

System	Summaries
GFR	8
LFR	19
MSR	17
SCWR	8
SFR	23
VHTR	17

Topic	Summaries
Economics	2
Fuel cycle	1
Materials	13
Proliferation Resistance and Physical Protection	2
Reactor physics	8
Safety and Risk Analysis	8
Thermal-hydraulics	11
Other (please specify)	6

Country of PhD Institution	Summaries
Belgium	4
Canada	1
China	8
Denmark	1
France	7
Italy	1
Japan	2
Poland	2
Puerto Rico	1
Russia	1
South Korea	3
Spain	1
Sweden	1
Switzerland	1
UK	1
USA	16



Country of PhD Institution	Summaries
Belgium	4
Canada	1
China	8
Denmark	1
France	7
Italy	1
Japan	2
Poland	2
Puerto Rico	1
Russia	1
South Korea	3
Spain	1
Sweden	1
Switzerland	1
UK	1
USA	16

51 Abstracts received from 16 countries and 22 candidates were selected to Pitch their Gen IV research

Jury's Review Criteria for "Pitch your Gen IV Research Competition"

Executive Summary

The Executive Summaries will be evaluated based on three criteria: **Relevance**, **Originality**, and **Significance**. Each criterion will be scored on a scale from 1 (low) to 5 (high). As a means of calibrating scoring, the following interpretation is suggested:

- **Relevance**: this score should reflect the relevance of the research to Gen IV systems. Direct work on one or more of the Gen IV systems should be scored 5, no relevance should be scored 1, correlated topics but not directly part of GIF should be scored in between (e.g., reprocessing)
- **Originality**: this score should be determined on how new the research is to the field and to what the degree the author contributed to the research
- **Significance**: this score is related to the degree to which the research will be groundbreaking viz a viz confirmatory in nature.

Video

The criteria for evaluating the videos are **Creativity**, **Communication Effectiveness**, and **Technical Quality**. These criteria are applied to the presentation by the author (the Executive Summary has already been judged so there is no need to repeat those criteria). The idea here is to judge the video as it were being given to an audience of technical people. Each criterion will be scored on a scale from 1 (low) to 5 (high). As a means of calibrating scoring, the following interpretation is suggested:

- **Creativity** is judged on how creative the prestation is in capturing the attention of the audience.
- **Communication Effectiveness** is judged on how easy it is to understand the presentation for a technical audience (not a subject matter expert).
- **Technical Quality** is judged on how well the presentation showcases the technical findings of the research.

Konstantin Mikityuk • 1st
at
2w • Edited

Pitch Your Generation-IV Research Competition 2021: 21 four-minute videos in which PhD students tell about their research related to Generation-IV nuclear systems. Please vote by clicking 'Like'. Your 'likes' will be accounted for in defining three winners before April 30, 2021.

Pitch Your Generation IV Research Competition 2021 - YouTube

youtube.com

This playlist contains 21 four-minute videos in which PhD students tell about their research...

Pitch Your Generation IV Research Competition 2021

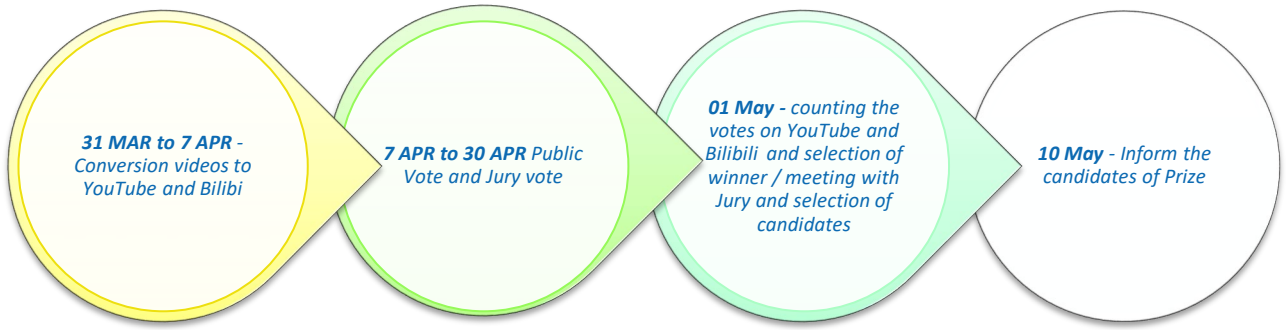
21 videos • 3,707 views • Updated 2 days ago

06 May 2021

This playlist contains 21 four-minute videos in which PhD students tell about their research related to Generation-IV nuclear systems. Please vote by clicking 'Like'. Your 'likes' will be accounted for in defining three winners before April 30, 2021. Details: https://www.gen-4.org/gif/jcms/c_1731...

GIF Education and Training Working Group

SUBSCRIBE



GEN IV International Forum
Expertise | Collaboration | Excellence

"Pitch your Gen IV Research" Competition

View and Vote for your Favorites

- Watch outstanding video presentations on advanced nuclear reactors by junior researchers from around the world (4 minutes each)
- "LIKE" your favorites
- Vote through April 30, 2021

Watch on YouTube

tinyurl.com/wwauk74

Watch on BiliBili

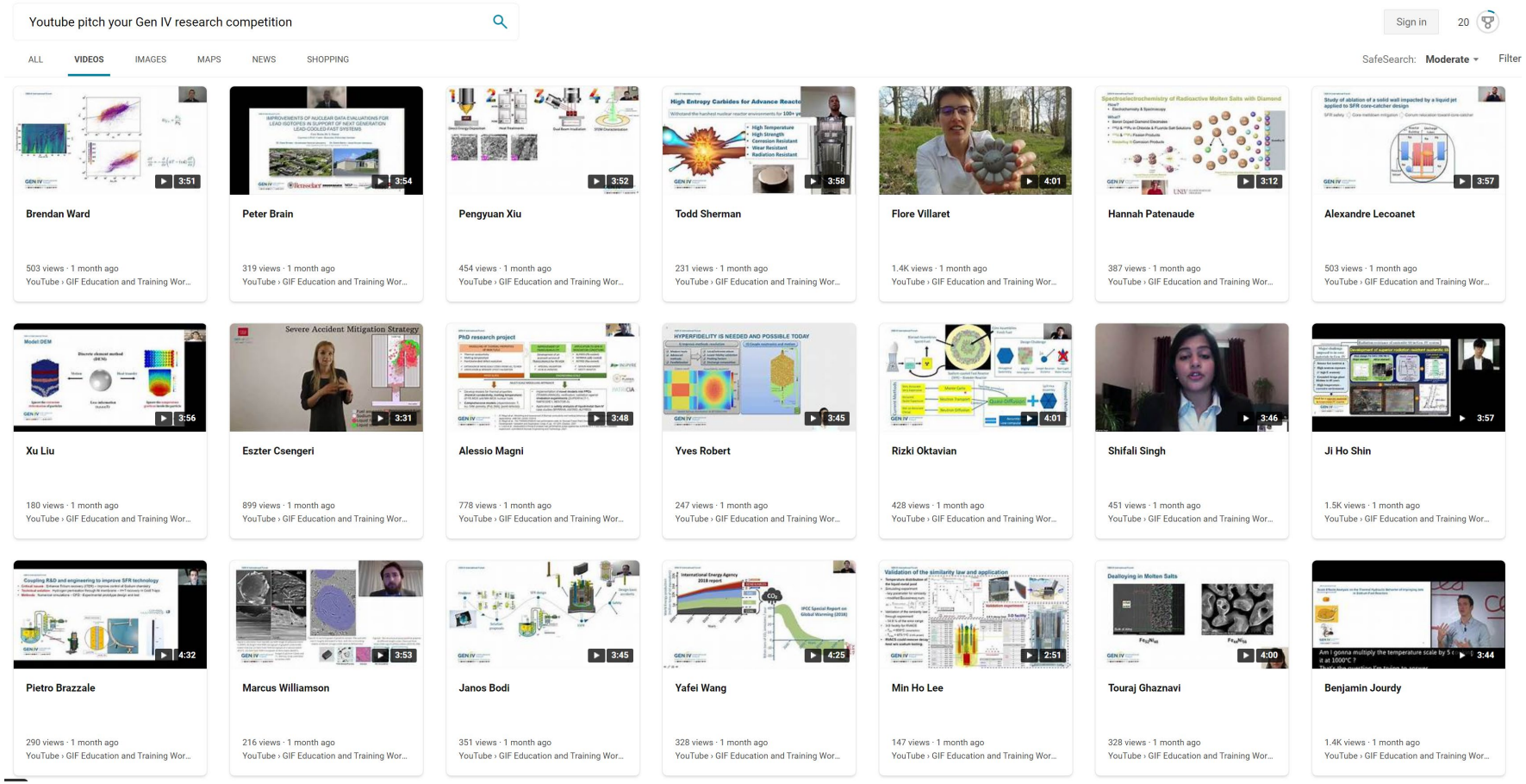
tinyurl.com/hdrrvfek

ANS

GEN IV International Forum

Pitch You Gen IV Research Competition

Videos @ tinyurl.com/wwauk74 and tinyurl.com/hdrvfek



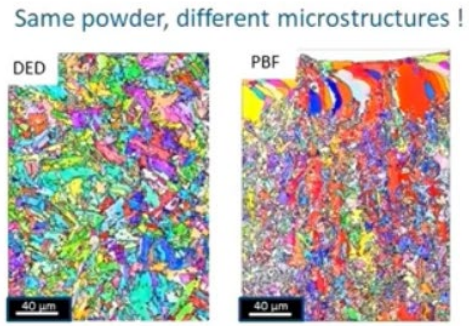
During the voting period (**April 7 to April 30**), the videos had more than **13,000 views** with a **peak of 2,200 views in a single day** when the competition was launched (April 7)

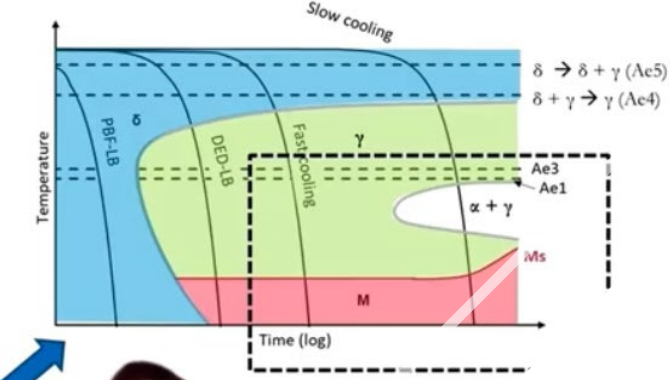
Typically, our YouTube channel gets ~90 views/day.

GEN IV International Forum
Expertise | Collaboration | Excellence

The winners of “Pitch your Gen IV Research Competition 2021”

- ***Prizes:*** Winners have been selected in both the popular vote category and the GIF Jury category. Winners are announced today at the EG/PG meeting as well as in June at the ANS meeting.
- **GIF Jury Category**
- The first-place winner is:
- (1) invited to present a webinar in December 2021 as part of the GIF Education and Training Working Group webinar series, and
- (2) invited to attend the next GIF Symposium planned in 2022 (travel expenses will be reimbursed on the OECD NEA basis).
- The second-place winner is:
- (1) invited to present a GIF webinar in March 2022, and
- (2) invited to attend a future GIF meeting in their region.
- **The Popular Vote Category (Likes with 80% weight and Views with 20% weight)**
- The winner - ***Audience Favorite*** - will be invited to present a GIF webinar in May 2022.





Limits of prior kn

$$r_f = f(T) = r_{\delta+\gamma} + \int_{Ae3}^{Ae4} 2\left(D(T).\frac{dT}{v}\right)^{0.5}$$

Model with thermodynamic and diffusion

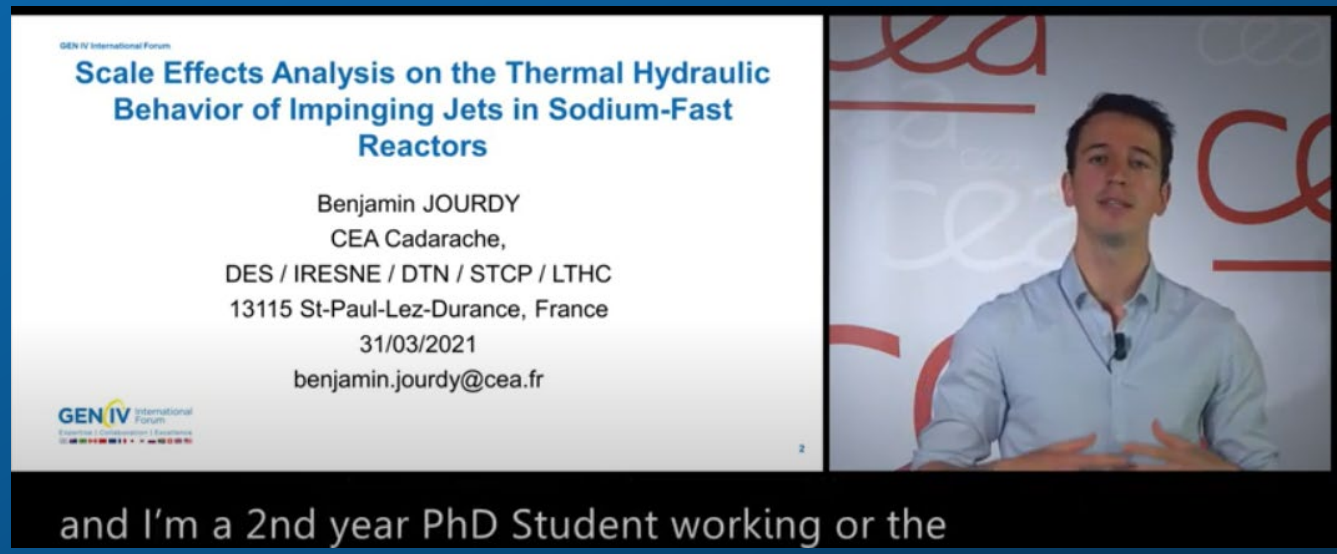
1st Place Winner of the Pitch Your Gen IV Research Competition

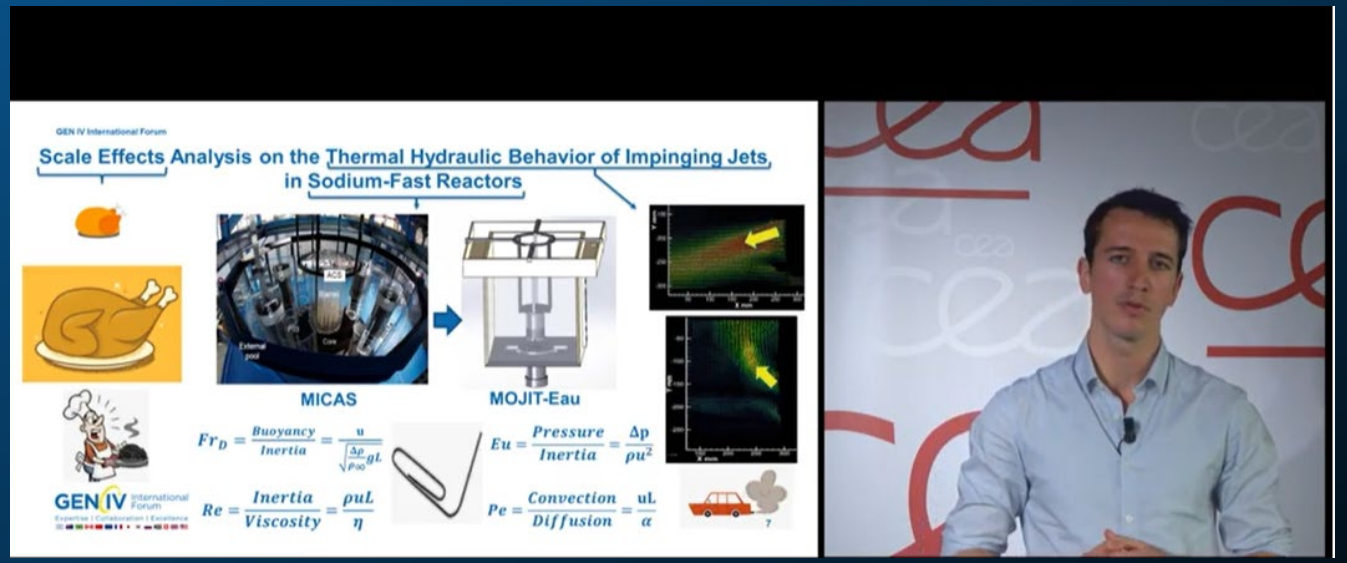
Development of an austenitic/martensitic gradient steel by additive manufacturing

Flore VILLARET
CEA (and now EDF), France
03/2021
flore.villaret@edf.fr

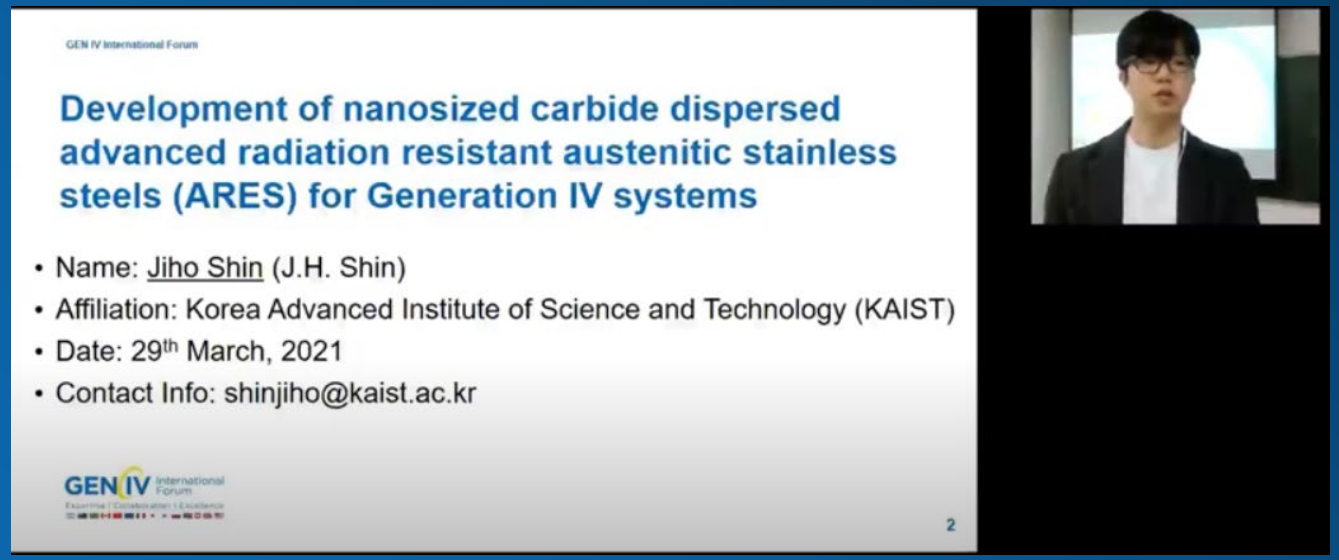
Videos @ tinyurl.com/wwauk74 and tinyurl.com/hdrvfek

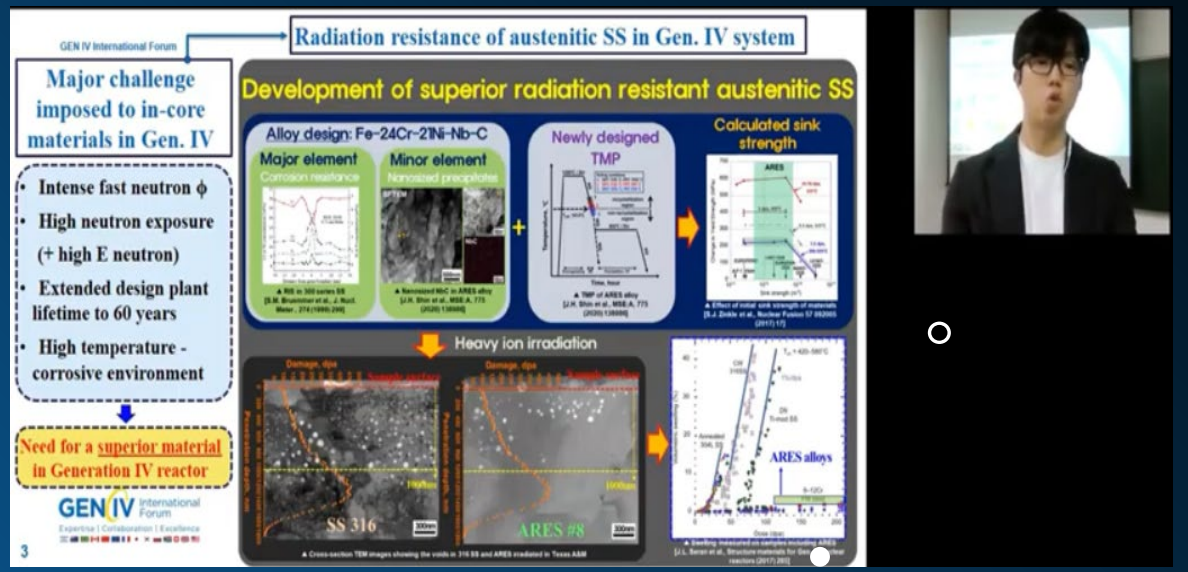
2nd Place Winner of the Pitch Your Gen IV Research Competition





Videos @ tinyurl.com/wwauk74 and tinyurl.com/hdrvfek





Popular Vote Winner of the Pitch Your Gen IV Research Competition

Videos @ tinyurl.com/wwauk74 and tinyurl.com/hdrvfek

Special GIF Webinar – Gen IV International Forum – 20th Anniversary Celebration 28 April 2021

Current and former GIF Chairs provided their perspectives on the progress Gen IV has made and the prospects for the deployment of Gen IV systems

Number of registrations: 381

Number of total attendees: 243

"Congrats to ALL for providing one of the best webinars EVER!
I appreciate getting to know better the many key players.
Thank you very much!!!"
Prof. Richard Steeves- Rethinkingnuclear.org

https://register.gotowebinar.com/recording/1142214141025716 8

GEN IV International Forum
Expertise | Collaboration | Excellence

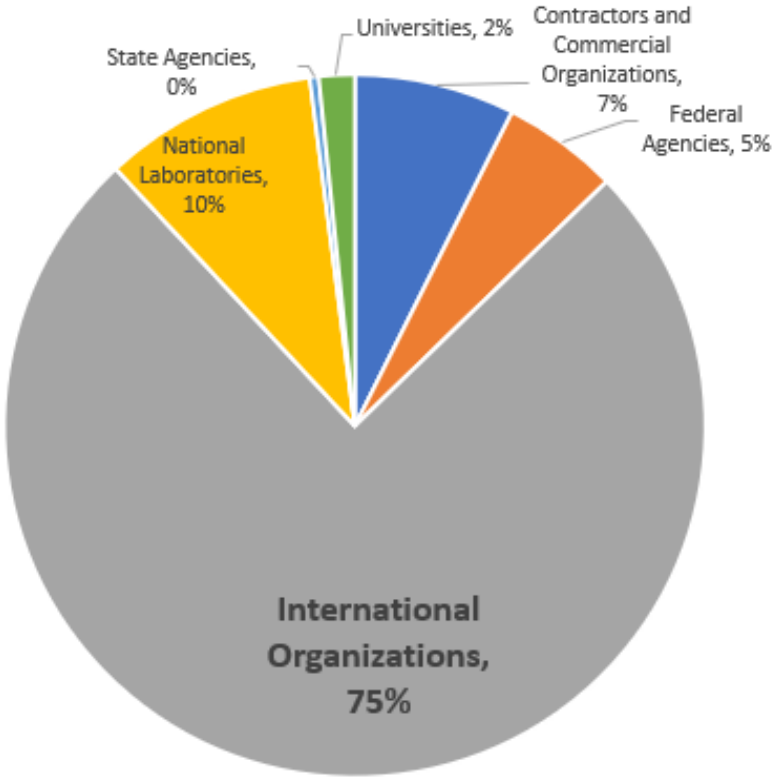
National Laboratories (10%)
Idaho National Laboratory
Brookhaven Laboratory
Pacific Northwest National Laboratory
Los Alamos National Laboratory
Argonne National Laboratory

Contractors and Commercial Organizations (7%)
Nuclear Energy Institute
TerraPower LLC
Southern Nuclear
Eckert and Ziegler Isotope Products
ClearPath
Elysium Industries
APT Research
Rethinkingnuclear.org
Flibe Energy

Universities (2%)
University of North Texas, Denton
North Carolina State
Massachusetts Institute of Technology
Colorado State University

State Agencies (0%)
NM

Federal Agencies (5%)
Orano Federal Services
Nuclear Regulatory Commission
United States Department of Energy
United States Department of Defense



International Organizations (75%)
Australian Nuclear Science and Technology Organisation
World Nuclear Association
International Atomic Energy Agency
European Commission – Euratom
Departamento de Energia Nuclear
McMaster University
National Resources Canada (NRCan)
Moltex Energy Canada
Universite de Sherbrooke
Idom Consulting
Canadian Nuclear Safety Commission (CNSC)
Canadian Nuclear Laboratories
Mirion Technologies (IST Canada) Inc.
China Institute of Atomic Energy
Centrum Vyzkumu Rez S.R.O.
UJV Rez A.S.
French Alternative Energies and Atomic Energy Commission (CEA)
Intelligent Energy Europe
Nuclear Energy Agency (NEA)
Framatome
Orange
Karlsruher Institute of Technology
Centre for Energy Research
Homi Bhabha National Institute
European Commission Joint Research Centre (JRC)
National Institute of Maritime, Port Aviation Technology
Japan NUS Co., Ltd.
Hitachi, Ltd.
Tokai University
Atomic Energy Society of Japan
Kyoto University
Mitsubishi Electric Corporation
Tokyo City University
PESCO Co., Ltd.
Japan Atomic Energy Agency
Nuclear Waste Management Organization of Japan (NUMO)
Japan Atomic Power Company
The University of Tokyo
Fuji Electric Co., Ltd.
Toshiba Energy Systems & Solutions Co.
Atomic Energy Society of Japan
Ibiden Co., Ltd.
Chubu Electric Power Co., Inc.
Sugino Machine Ltd.
Japan Atomic Industrial Forum
University of Yamanashi
Tokyo Institute of Technology
Central Research Institute of Electric Power Industry
Japan Academic Association for Copyright Clearance
InterQ Japan
Nuclear Systems Association
The Institute of Applied Energy
Hokkaido Electric Power Co.
Embassy of Japan
International Science and Technology Center
Korea Electric Power Corporation (KEPC)
Korea Nuclear International Cooperation Foundation
Korea Atomic Research Institute (KAERI)
Atomic Creative Technology (ACT)
Korea Institute of Nuclear Nonproliferation and Control (KINAC)
Universidad Autonoma Metropolitana
National Center for Nuclear Research (NCBJ)
University Politehnica Bucharest
Rosatom Russia
Kurchatov Institute
Harbin Engineering University
Endesa
Universidad Politecnica de Madrid
Paul Scherrer Institute
Istanbul Technical University
Sewa
National Nuclear Laboratory
World Nuclear Association
Urenco Enrichment Company Limited
Centre for Environment, Fisheries and Aquaculture Science (CEFAS)
Office for Nuclear Regulation (ONR)
Energus
World Nuclear News
Nuclear Innovation and Research Advisory Board (UK NIRO and BEIS)
Jacobs Engineering Group Inc.
UK Environment Agency
Sound and Air Testing (SAAT)

Generation IV International - 20th Anniversary Celebration

Total Attendees: 243

Series of Gen-IV webinars

52 webinars have been presented and are archived:

https://www.gen-4.org/gif/jcms/c_82831/webinars

Webinars have been converted to YouTube Video:

https://www.youtube.com/channel/UCEHOQ63gD01fSKbClY9XvSQ

Registration Link
https://register.gotowebinar.com/register/1542507475351191563

GEN IV International Forum
Expertise | Collaboration | Excellence

GEN IV International Forum
Expertise | Collaboration | Excellence

Webinar Invite

Education and Training Working Group

Join us on May 25, 2021, 8:30 am EDT (UTC-4)

Opportunities for Generation-IV Reactors Designers through Advanced Manufacturing Techniques

The development of critical design criteria for new advanced reactor systems, components, and materials requires an understanding of both fabrication and the irradiation environment during normal operating and accident conditions. Next-generation researchers and designers are therefore challenged not only by demands for improved performance, they must also work to shorten the development and commercialization lifecycle for new nuclear reactors and systems to remain competitive. This provides unique and exciting opportunities for all contributors to this field of study. This presentation will offer a strategic overview of the impact that advanced manufacturing has on the lifecycle of new generation reactors. By evaluating state-of-the-art practices found in other large manufacturing industries, this presentation provides an overview of major innovation areas that are considered to benefit the GEN-IV systems (SFR, GFR, LFR, FSMR...). Synergetic advanced manufacturing approaches beneficial to the collective GEN-IV systems, with some examples of differentiating approaches necessary for specific reactor designs, are discussed. Furthermore, new paradigms in licensing approaches for additively manufactured parts will be discussed.

Free webcast!

May 25, 2021 8:30 am EDT (UTC-4)

Register NOW at:
https://attendee.gotowebinar.com/register/1542507475351191563

Who should attend:
policymakers, managers, regulators, students, general public

Dr. Isabella J. van Rooyen holds a PhD in physics, an MSc in metallurgy, and an MBA. She is the National Technical Director for Advanced Methods for Manufacturing Programs for the Department of Energy-Nuclear Energy Enabling Technologies.
She is also a distinguished staff scientist at the Idaho National Laboratory (INL) where she has led as principal investigator (PI) a variety of research projects for nuclear applications through competitive awards by industry strategic partners, lab-directed research funds, National Scientific User Facility (NSUF), and the Nuclear Engineering University Program (NEUP). These research projects focus on tristructural isotropic (TRISO)-coated particles, U_3Si_2, integrated fuel fabrication processes, high-temperature compact heat exchangers, SiC-ODS alloy gradient nano-composite cladding, fission product transport mechanisms, additive manufacturing qualification reviews, and advanced manufacturing methods. Dr. van Rooyen also led the advanced electron microscopy and micro-analysis examinations for the Advanced Gas Reactor TRISO fuel development program from May 2011–January 2021.
Dr. van Rooyen's engineering and scientific exposure includes hands-on experience in a wide variety of pursuits; examples include heat treatment, surface treatments and coatings, welding procedures, casting processes, powder fabrication, and consolidation processes. Prior to joining INL in 2011, Dr. van Rooyen held various technical leadership roles in the nuclear, aerospace, and automotive industries in South Africa, most notably the research at Pebble Bed Modular Reactor (PBMR) Company and NECSA and DENEL Aviation.

Dr. van Rooyen has more than 50 peer-reviewed journal publications, more than 40 conference papers and presentations, over 100 company-specific technical and scientific reports, seven invention disclosures, one additive manufacturing patent awarded in 2020, one patent in process of issuing, and five patents filed on additive manufacturing in 2018–2020.

Upcoming Webinars

24 June 2021
In Service Inspection and Repair Developments for SFRs and Extension to other Gen4 Systems, Dr. Francois Baque, CEA, France

27 July 2021
Evaluating Changing Paradigms Across the Nuclear Industry, Ms. Jessica Lovering, Winner of the ANS 2020 Pitch your PhD Competition

26 August 2021
Comparing and Contrasting Approaches to Quality Assurance fro Nuclear Applications, Mr. Vince Chermak, INL, US

	2016 (4 webinars)	2017 (12 webinars)	2018 (8 webinars)	2019 (12 webinars)	2020 (12 webinars)	2021 (4 webinars)
Introduction 3 webinars	**Atoms for Peace** - John Kelly, USA **Introduction to Nuclear Reactor Design** - Claude Renault, France			**European Sodium Fast Reactor, An Introduction** - Konstantin Mikityuk, Switzerland		
Gen IV Systems 16 webinars	**Sodium cooled Fast Reactor** - Bob Hill, USA	**Lead Fast Reactor** - Craig Smith, USA **Gas cooled Fast Reactor**, Alfredo Vassile, France **Very High Temperature Reactors** - Carl Sink, USA **Supercritical Water Reactors (SCWR)**, Laurence Leung, Canada **Fluoride cooled-High Temperature Reactors** - Per Peterson, USA **Molten Salt Reactors** - Elsa Merle, France	**MYRRHA An Accelerator driven System Based on LFR Technology** - Hamid Ait Abderrahim, Belgium **Molten Salt Actinide Recycler & Transforming System with and without Th-U Support: MOSART** - Victor Ignatiev, Russia	**Lead Containing mainly isotope Pb-208: New Reflector for Improving Safety of Fast Neutron Reactors** - Evgeny Kulikov, Russia **Gen IV Coolants Quality Control** - Christian Latge, France **Czech Experimental Program on MSR Technology Development**, Jan Uhlir, Czech Republic	**GIF VHTR Hydrogen Production Project Management Board**, Sam Suppiah, Canada **Thermal Hydraulics in Liquid Metal Fast Reactor**, Antoine Gerschenfeld, CEA, France **Micro-reactors: A Technology Option for Accelerated Innovation**, D.V. Rao, USA **Overview of Small Modular Reactor Technology Development**, Frederik Reitsma, IAEA	
Operational Experience 12 webinars		**Feedback Phenix and Superphenix** - Joel Guidez, France	**Design, Safety Features and Progress of HTR-PM** - Yujie Dong, China **Astrid Lessons Learned** - Gilles Rodriguez, France **Advanced Lead Fast Reactor European Demonstrator, ALFRED Project** - Alessandro Alemberti, EC **Russia BN 600 & BN 800** - Ilya Pakhomov, Russia	**Safety of Gen IV Reactors** - Luca Ammirabile, EC **The ALLEGRO Experimental Gas Cooled Fast Reactor Project** - Ladislav Belovsky, Czech Republic **Passive Decay Heat Removal**, Mitchell Farmer, ANL USA	**Molten Salt SFR Safety Design Criteria (SDC) and Safety Design Guideline (SDG)**, Shigenobu Kubo, JAEA, Japan **Reactor Safety Evaluation - A U.S. Perspective**, David Holcomb, ORNL, USA	**Introducing New Plant Systems Design Code**, Nawal Prinja, Jacobs, UK **Experience of HTTR Licensing for Japan's New Nuclear Regulation**, Etsuo Ishitsuka, JAEA, Japan

	2016 (4 webinars)	2017 (12 webinars)	2018 (8 webinars)	2019 (12 webinars)	2020 (12 webinars)	2021 (4 webinars)
Gen IV Cross Cutting Topics 8 webinars		**Energy Conversion**, Richard Stainsby, United Kingdom **Estimating Costs of Gen IV Systems** - Geoffrey Rothwell, NEA/OECD	**Materials Challenges for Gen IV Reactors** - Stu Maloy, USA **Proliferation Resistance and Physical Protection of Gen IV Reactor Systems**, Robert Bari, USA		**Maximizing Clean Energy Integration: The Role of Nuclear and Renewable Technologies in Integrated Energy Systems**, Shannon Bragg-Sitton, INL, USA **Global Potential for Small and Micro Reactor Systems to Provide Electricity Access**, Amy Schweikert, USA **Neutrino and Gen IV Reactor Systems**, Jonathan Link, USA	**Overview of Waste Treatment Plant, Hanford Site**, David Peeler, PNNL, USA
Fuel Types 5 webinars		**General Consideration on Thorium as a Nuclear Fuel** - Franco Michel-Sendis, NEA/OECD **Metallic Fuels for SFRs** - Steven Hayes, USA		**Advanced Gas Reactor TRISO Particle Fuel** - Madeline Feltus, USA	**Performance Assessments for Fuels and Materials for Advanced Nuclear Reactors**, Daniel LaBrier, ISU, USA	**MOX Fuel for Advanced Reactors** Nathalie Chauvin, CEA France
Sustainability and Fuel Cycle 4 webinars	**Closing the Fuel Cycle**, Myeung Seung, Republic of Korea	**Sustainability, A Relevant Approach for Defining Future Nuclear Fuel Cycles** - Christophe Poinssot, France		**Scientific and Technical Problems of Closed Nuclear Fuel in Two-Components Nuclear Energetics** - Alexander Orlov, Russia	**Comparison of 16 Reactors Neutronic Performance in Closed Th-U and U-Pu Cycles**. Jiri Krepel, PSI, Switzerland	
Winners of Pitch Competition 4 webinars				**Formulation of Alternative Cement Matrix For Solidification/Stabilization of Nuclear Waste** - Matthieu de Campos, France **Interactions between Sodium and Fission Products in case of a severe Accident in a Sodium-cooled Fast Reactor** - Guilhem Kauric, France **Security Study of Sodium Gas Heat Exchangers in Frame of Sodium-Cooled Fast Reactors** - Fang Chen, France	**Development of Multiple Particle Positron Emission Particle Tracking for Flow Measurement**, Cody Wiggins, VCU, USA	

52 GIF WEBINARS PRESENTED AND ARCHIVED FROM 2016 TO 2021

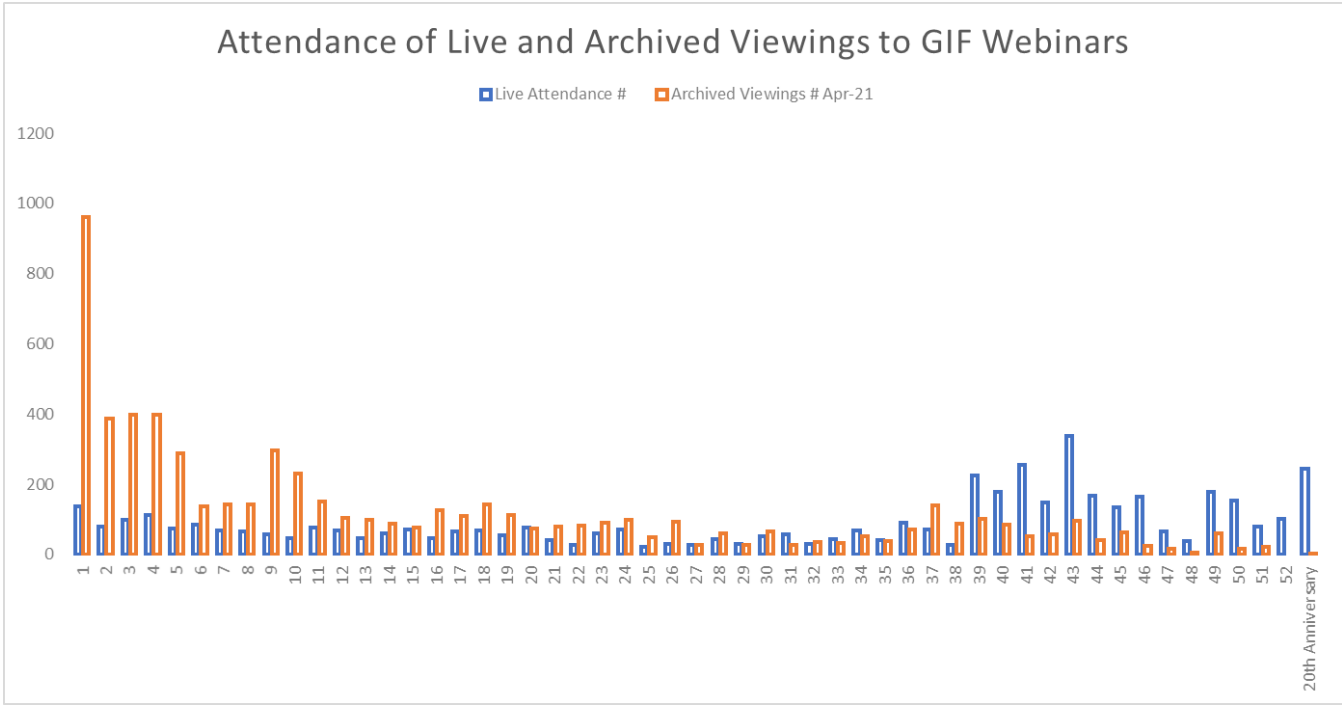
As of 30 April 2021

Attendance of Live Webinars: **4744**

Total of live attendance was 2681 on 18 May 2020

Attendance of Archived Webinars: **6243**

Total of archived attendance was 4234 on 18 May 2020



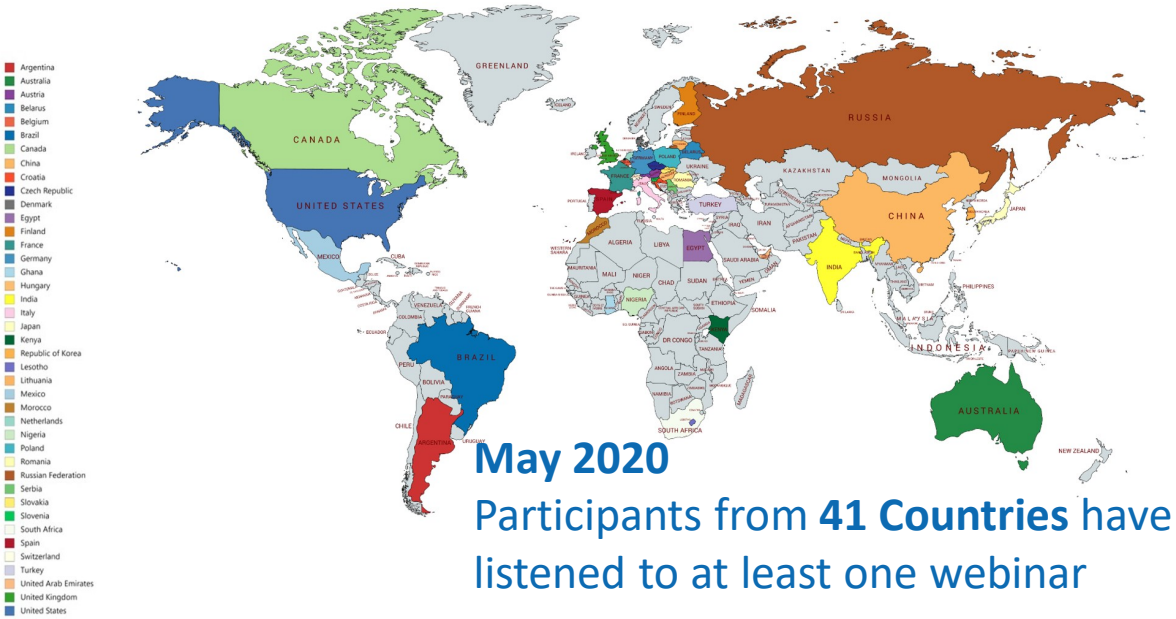
Total Viewing: **10987**

Total viewing was 6915 on 18 May 2020

GEN IV International Forum
Expertise | Collaboration | Excellence

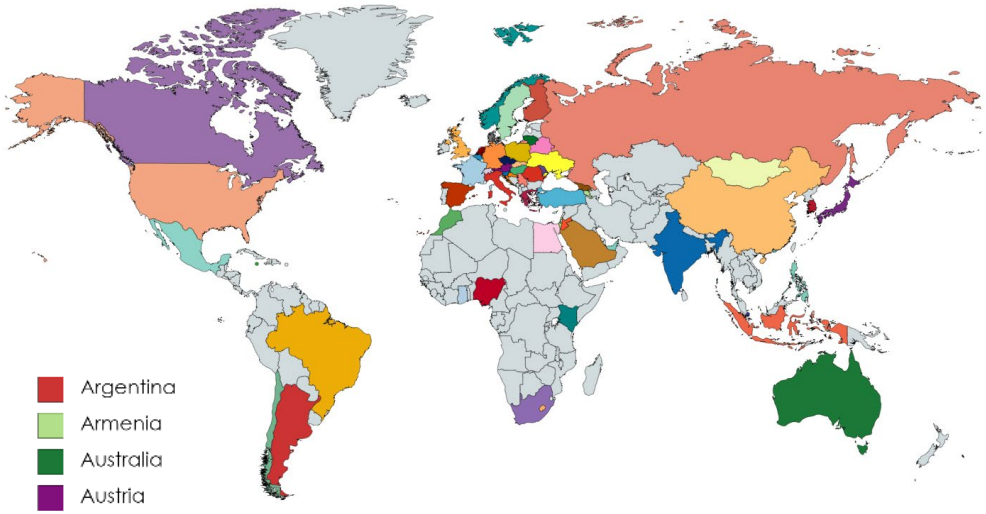
October 2019

Participants from **20 Countries** have listened to at least one webinar



May 2020

Participants from **41 Countries** have listened to at least one webinar

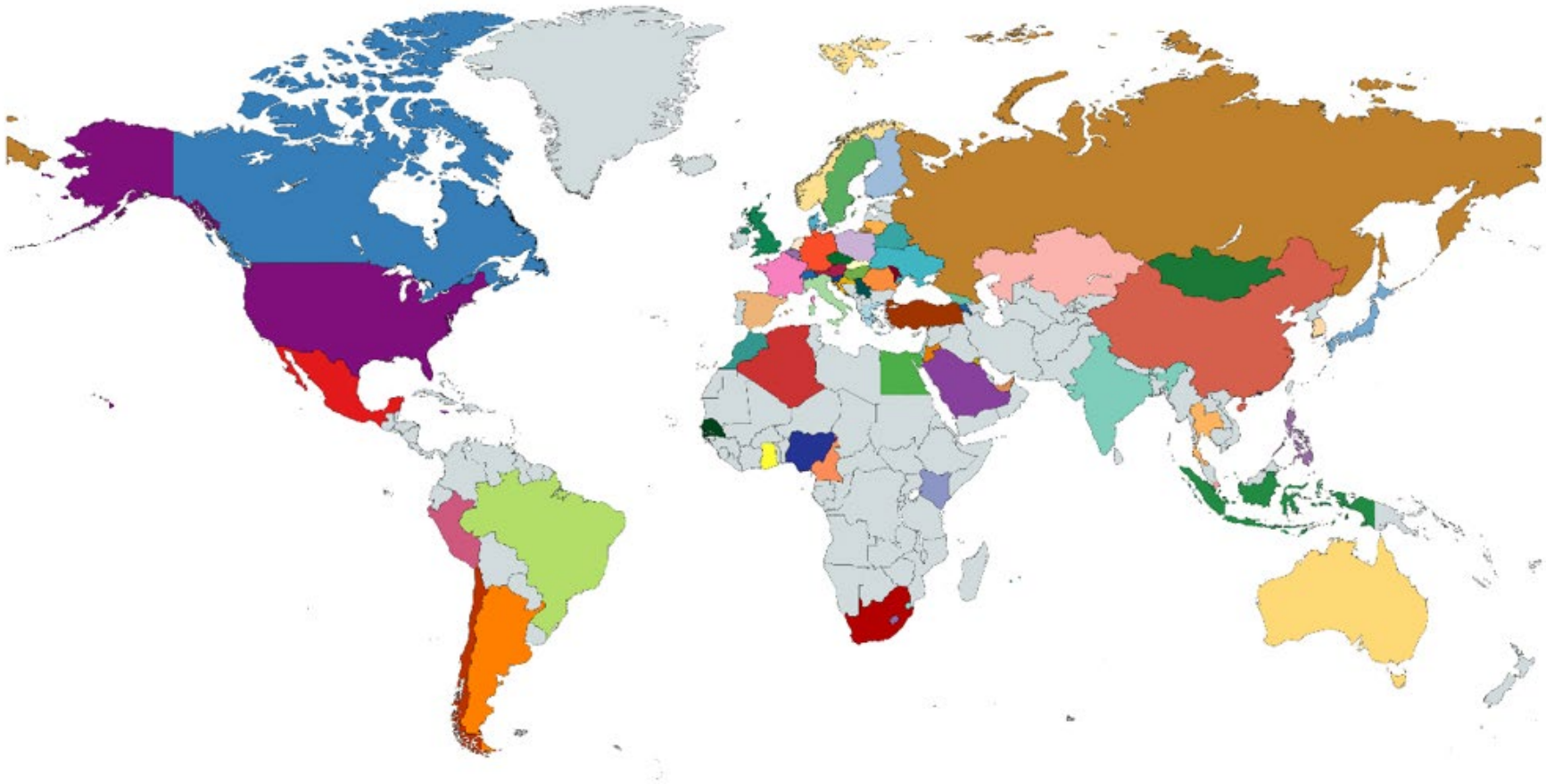


October 2020

Participants from **58 Countries** have listened to at least one webinar

GIF ETWG – REACHING OUT THE INTERNATIONAL COMMUNITY

Algeria
Argentina
Armenia
Australia
Austria
Belarus
Belgium
Brazil
Cameroon
Canada
Chile
China
Croatia
Czech Republic
Denmark
Egpyt
Finland
France
Georgia
Germany
Ghana
Greece
Hong Kong
India
Indonesia
Israel
Italy
Jamaica
Japan
Jordan
Kazakhstan
Kenya
Kuwait
Lesotho
Lithuania
Mexico
Moldova
Mongolia
Morocco
Nigeria
Norway
Peru
Philippines
Poland
Reunion
Romania
Saint Kitts and Nevis
Saudi Arabia
Senegal
Serbia
Singapore
Slovakia
Hungary
Slovenia
South Africa
South Korea
Spain
Swaziland (Eswatini)
Sweden
Switzerland
Thailand
Turkey
Ukraine
United Arab Emirates
United Kingdom
United States



May 2021

Participants from **66 Countries** have listened to at least one GIF webinar

Webinars planned until April 2022

Presenter	Title of Webinar	Tentative date for Webinar presentation
Isabella Van Rooyen INL, USA	Advanced Manufacturing for Gen IV Reactors	25 May 2021
François Baque, CEA, France	In Service Inspection and Repair Developments for SFRs and extension to other Gen4 systems.	24 June 2021
Jessica Lovering, Carnegie Mellon University, USA Winner of the ANS 2020 Pitch your PhD competition	Evaluating changing paradigms across the nuclear industry	27 July 2021
Vince (Alois) Chermak , INL, USA	Graded Approach: Not just Why and When, but How".	26 August 2021
Julia Kyzina, IPPE, Russia	Experimental R&D in Russia to justify Sodium Fast Reactors	23 September 2021
John Vienna, PNNL, USA	Nuclear Waste Management Strategy for Molten Salt Reactor Systems	28 October 2021
Jun Wang, the University of Wisconsin, Madison, USA	Geometry Design and Transient Simulation of a Heat Pipe Micro Reactor	18 November 2021
1st Prize Winner of PyGR	TBD	December2021
David Shropshire, INL, USA	Economics of Gen IV Systems	January 2022
Prof. Prinja, Nawal K JACOBS, UK	Artificial Intelligence in support of NE Sector	February 2022
2nd Prize Winner of PyGR		March 2022
Dr. Kemal Pasamehmetoglu, INL, USA	Versatile Test Reactor	April 2022
Public Vote Winner of PyGR Competition		May 2022

GEN IV International Forum
Expertise | Collaboration | Excellence