



# Personal responsibilities

- I participated in 14 of the 16 BeWS since 1989
- Often as part of the local organizing committee
- Several times BeWS and BeYOND in conjunction
- Up to the Millenium the innovation system was discipline based
- BeWS is a child of MODE 1 and has reached Mode 2, now
- MODE 2, in the last 20 years has been transdisciplinary, like BeYOND
- Now we are entering MODE 3, a multidisciplinary construct
- BeYOND should follow this evolution by thinking beyond Beryllium
- BeYOND-X has to take “Global Fusion Partnerships” into account



*BeWS-15 is organized under the auspices of the IEA Technology Collaboration Program on Fusion Materials (FM TCP)*



# BeYOND-GFP

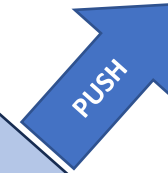
# BeYond

Public & State Funding



Industry, MATERION, NGK  
Gauss Fusion Initiative  
Kyoto Fusioneering

The Public Politicians



FUSION  
FOR FUTURE



Fusion-Start-Up-Scene, FIA

Science Associations  
KIT, MIT, ITER

LET'S CATCH THE STAR

# RESEARCH ON BEHALF OF MANKIND



# FUSION

FOR FUTURE

[www.fusion-for-future.de](http://www.fusion-for-future.de)



## The Future of the BeYOND

### Industrial Forum

Aniceto Goraieb, KBHF

GmbH

Chris Dorn, Be4FUSION LLC



**16th International Workshop  
on Beryllium Technology  
(BeWS-16)**

**Santander, Spain  
October 2023**



# Presentation Outline

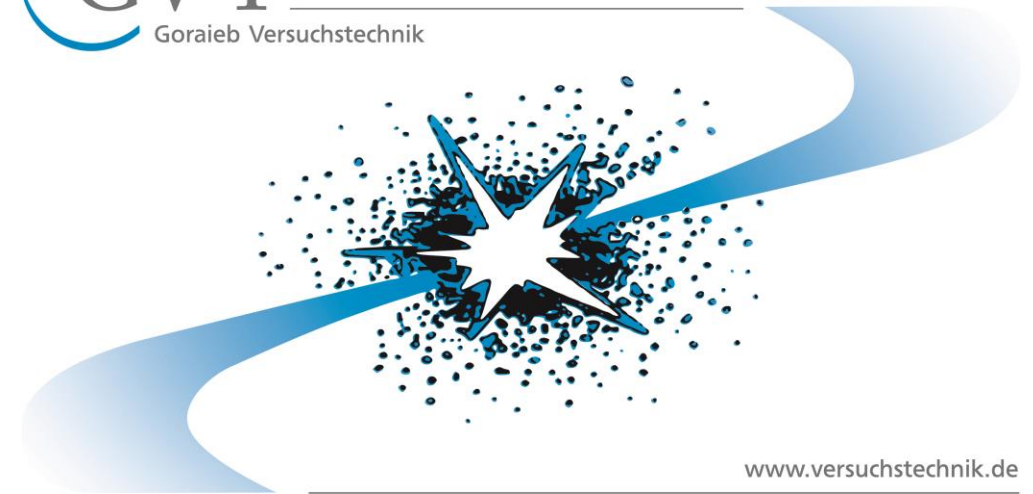
- Founding of BeYOND
  - Workshop Concept
  - Program Focus
  - Sponsors & Partners
- History of the Events
  - Initially Held Annually
  - Transition to Every 2 Years
- Changes in the Fusion Industry
  - Traditional Structure (1980s-2010s)
  - New Landscape (starting late 2010s)
- Need for Public-Private Partnerships
- Proposal for BeYOND-X





# We came a long way through fusion history

- The Start-Up GVT was established 1993
  - Specialized on Solid Breeder Blanket Development
    - Material design, testing & pilot production
    - Work performed on FLiBe, as well
- Nonprofit organization found in 2000
  - “Fusion for Future” by mankindproject e.V.
    - Events for children and adults
    - Science, industry, politics and the public
- KBHF, a Spin-In at KIT established 2009
  - Private infrastructure for Blanket handling
    - Public-Private-Partnership on KIT Campus
    - Transfer company science to industry
- BeYOND started the same year







# Founding of BeYOND

- Workshop Concept
  - Link Research Centers to Industry
  - Greater Emphasis on Industrial Issues
    - Scale-Up from Lab to Production
    - Technology Transfer
    - Environmental, Health & Safety (EH&S)
- Starting the Series
  - Partnership: KBHF & Brush Wellman
  - Funding from KIT & Industry Partners
- Evolution of Program
  - Even-Number Years (opposite BeWS)
  - Timing Coordinated with SOFT
  - Always Held in Karlsruhe, Germany





# History of the Events

- BeYOND-I: Karlsruhe, Germany, 2009
- BeYOND-II: Porto, Portugal, 2010
- BeYOND-III: Karlsruhe, Germany, 2011
- BeYOND-IV: Karlsruhe, Germany, 2012
- BeYOND-V: Barcelona, Spain, 2013
- BeYOND-VI: San Sebastian, Spain, 2014
- BeYOND-VII: Berlin, Germany, 2016
- BeYOND-VIII: Karlsruhe, Germany, 2018
- BeYOND-IX: Karlsruhe, Germany, 2022





# Next Steps to Global Fusion Partnerships

- First time in June 2023, at SOFE
  - Symposium of Fusion Engineering in Oxford
  - A brainchild of the BeYOND founders
  - Supported by Kyoto Fusioneering (KF) in UK
  - Also, by Fusion Industry Association (FIA, USA)
  - Organized with the help of UKAEA
    - Discussed the opportunities of PPP's
    - Showed the importance of partnerships to accelerate Fusion
    - Many different pathways already exist and are used for this purpose
    - Synergies play a significant role to get ready in time (1 or 2 decades?)
    - Non-Profit-Organizations might be an additional key to the success







# Mankindproject e.V. has just been restarted

- Communication
  - To keep the public informed
  - Connecting Engineers and Visioners
  - Bridging between science & Industry
  - Student programs for junior stuff
- Event management
  - Support of BeYOND
  - Historical venues to catch up with science
- Co-Financing of research programs
  - Crowd Funding
  - Organization of charity events
  - Tax refunds for donations





# Merging the concepts at BeYOND-X?

- Global Fusion Partnerships need:
  - New interested and qualified staff
  - Technology Transfer options
  - Partners that allow to use synergies
  - Public and political support
- BeYOND-GFP could help with:
  - Short Term TT:
    - Finding Technology near state-of-the-art
  - Mid Term TT:
    - Create research partnerships, train students
  - Long Term TT:
    - Indirect technology transfer back to science labs
- The Nonprofit Organizations role would be:
  - Crowd Funding, State Funding
  - Organization of charity events
  - Tax refunds for donations



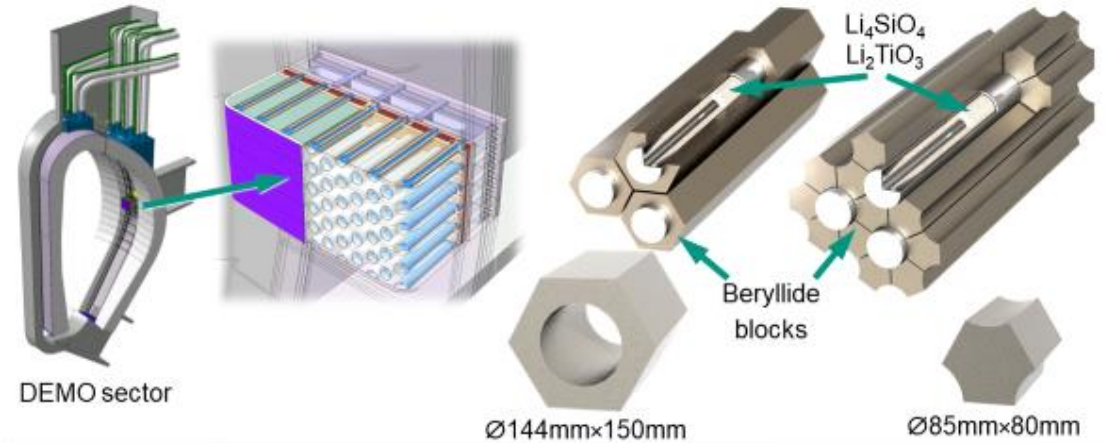




# State of the Art and beyond

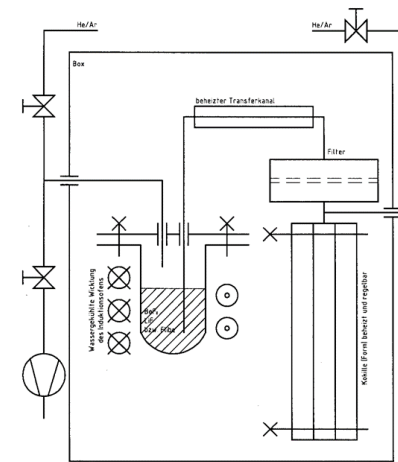


Helium-cooled pebble bed blanket design of DEMO



2 17.10.2023 Dr. Ramil Gaisin Institute for Applied Materials – Applied Materials Physics

- Near State of the Art:
  - The Solid Breeder Concept at KIT
    - ULBA is producing our Be-Ti material concept
    - We run the KALOS pilot production facility at KIT
    - Mass production will be available, soon!
    - The concept is already qualified for Fusion
- Mid Term Technology Transfer:
  - The Molten Salt (FLiBe) Concept
    - Mass production has already begun at KAIROS
    - Until now only data for Fission available (60ies)
    - Has to be qualified for Fusion application, now!
- Long Term Technology Transfer:
  - Liquid metal Concepts for the Breeder Blanket
    - MHD Effects cause difficulties in compact machines
    - Coatings have to prove their long-term stability



# Thank You Very Much for Your Attention!



[www.fusion-for-future.de](http://www.fusion-for-future.de)

Aniceto Goraieb, KBHF  
GmbH

**Be<sup>4</sup>FUSION**  
Specialty Materials & Business Consulting

<https://be4fusion.com/>

Chris Dorn, Be4FUSION LLC



# BeYOND-GFP-Format

- 2 days workshop
  - 1<sup>st</sup> day: Need of TT, Fusion Start-Ups
  - Workshop-dinner
  - 2<sup>nd</sup> day: Availability, Science & Industry
- In conjunction with SOFT
  - In the even years, late September
  - SOFT 2024 in Dublin, KW39
- Charity, Historical Dinner
  - In the odd years
  - Student presentations, out of the time
  - Friday Evening Dinner-Event
  - Next time “The golden 20ies” maybe in Berlin 2025

