



Horizon 2020  
Programme

**GENIORS**

*Research and Innovation Action (RIA)*

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<http://geniors.eu/>



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**Clustering Events 2**

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Authors : Mr. Stéphane BOURG (CEA), Stéphane Bourg, CEA

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| Author(s)           | Mr. Stéphane BOURG, Stéphane Bourg, CEA |
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## Summary

The second GENIORS clustering event was a joint summer school gathering H2020 GENIORS and INSPYRE communities . It was organised in May 2019 at TU Delft and gathered 36 students and 25 speakers from both community

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## Approval

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|---------------------|---------------------------------|
| Date                | By                              |
| 2020-09-01 09:39:08 | Dr. Thomas CARDINAELS (SCK-CEN) |
| 2020-09-01 16:44:56 | Mr. Chris RHODES (NNL)          |
| 2020-09-01 17:16:47 | Mr. Stéphane BOURG (CEA)        |

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## EXECUTIVE SUMMARY

The second GENIORS clustering event was a joint summer school gathering H2020 GENIORS and INSPYRE communities .

It was organised in May 2019 at TU Delft and gathered 36 students and 25 speakers from both community

## OBJECTIVE AND AUDIENCE

The first school of the INSPYRE project, focused on the Generation IV reactors fuel cycle, was organised jointly with the GENIORS project (GEN IV integrated oxide fuels recycling strategies) from May 13th to 17th, 2019 at the Delft University of Technology in the city of Delft (The Netherlands).

The school, designed for graduate students, young scientists and professionals, gave a comprehensive overview of the nuclear fuel cycle for next generation nuclear reactors. It covered key aspects of chemistry, physics and materials science involved at each stage of the fuel cycle, with a particular focus on the challenges of oxide fuels. 36 participants attended the school, and 25 speakers gave lectures in their respective domains of expertise.

## COURSES AND TUTORIALS

The courses and tutorials included Generation IV systems and closed fuel cycles, fuel manufacturing and qualification, detailed fuel characterization, in-reactor behaviour, multiscale modelling, fuel performance codes, fuel reprocessing and recycling. In addition, the participants visited the reactor and experimental halls of the Reactor Institute Delft



## PROGRAM

| Program INSPYRE first summer school |             |                                                                    |                                                                           |                                           |
|-------------------------------------|-------------|--------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------|
| 13-17 May 2019                      |             |                                                                    |                                                                           |                                           |
|                                     |             | Topic                                                              | Courses and tutorials                                                     | Speaker                                   |
| Monday 13/05                        | 10.00-10.15 |                                                                    |                                                                           | M. Bertolus, <i>CEA DEN</i>               |
|                                     | 10.15-11.00 |                                                                    |                                                                           | A. Alemberti, <i>Ansaldo Nucleare</i>     |
|                                     | 11.00-11.45 |                                                                    |                                                                           | S. Bourg, <i>CEA DEN</i>                  |
|                                     | 11.45-12.00 |                                                                    | Coffee break                                                              |                                           |
|                                     | 12.00-12.45 | Innovative (oxide) fuels containing minor actinides                | Structural materials challenges for ESNII reactors                        | L. Malerba, <i>CIEMAT</i>                 |
|                                     | 12.45-14.00 |                                                                    | Lunch                                                                     |                                           |
|                                     | 14.00-14.45 |                                                                    |                                                                           | K. Popa, <i>JRC Karlsruhe</i>             |
|                                     | 14.45-15.30 |                                                                    |                                                                           | R. Vauchy, <i>CEA DEN</i>                 |
|                                     | 15.30-16.00 |                                                                    | Coffee break                                                              |                                           |
|                                     | 16.00-16.45 |                                                                    | Thermodynamic aspects of nuclear fuels (experiments)                      | R. Konings, <i>JRC Karlsruhe</i>          |
|                                     | 16.45-17.45 |                                                                    | Student presentations (3 min each)                                        |                                           |
| Tuesday 14/05                       | 9.00-9.45   | Fuel behaviour under irradiation (Part I)                          | Thermodynamic aspects of nuclear fuels (modelling)                        | C. Guéneau, <i>CEA DEN</i>                |
|                                     | 9.45-10.30  |                                                                    | Fuel chemistry and thermodynamic aspects under irradiation                | R. Konings, <i>JRC Karlsruhe</i>          |
|                                     | 10.30-10.45 |                                                                    | Coffee break                                                              |                                           |
|                                     | 10.45-11.30 |                                                                    |                                                                           | J. Noirot, <i>CEA DEN</i>                 |
|                                     | 11.30-12.15 | Fuel behaviour under irradiation (Part II)                         |                                                                           | E. D'Agata, <i>JRC Petten</i>             |
|                                     | 12.15-13.30 |                                                                    | Student presentations (3 min each)                                        |                                           |
|                                     | 13.30-14.30 |                                                                    | Simulation methods and multiscale modelling                               | P. Olsson, <i>KTH</i>                     |
|                                     | 14.30-15.15 |                                                                    | Coffee break                                                              |                                           |
|                                     | 15.15-15.45 |                                                                    |                                                                           | L. Luzzi, <i>Politecnico di Milano</i>    |
|                                     | 15.45-16.30 |                                                                    |                                                                           | P. Olsson, <i>KTH</i>                     |
|                                     | 16.30-17.15 |                                                                    |                                                                           | M. Bertolus, <i>CEA DEN</i>               |
|                                     | 17.15-18.00 |                                                                    |                                                                           | C. Guéneau, <i>CEA DEN</i>                |
|                                     |             |                                                                    |                                                                           | E. Epifano, <i>ONERA</i>                  |
|                                     | 18.30-21.00 |                                                                    | School banquet                                                            |                                           |
| Wednesday 15/05                     | 9.00-9.45   | Irradiation tests in research reactors and experimental facilities |                                                                           | A. Rineiski, <i>KIT</i>                   |
|                                     | 9.45-10.30  |                                                                    |                                                                           | R. Hania, <i>NRG</i>                      |
|                                     | 10.30-10.45 |                                                                    | Coffee break                                                              |                                           |
|                                     | 10.45-11.30 |                                                                    |                                                                           | J. Noirot, <i>CEA DEN</i>                 |
|                                     | 11.30-12.15 | Fuel reprocessing, recycling and radioactive waste (Part I)        |                                                                           | M.F. Barthe, <i>CNRS-CEMHTI</i>           |
|                                     | 12.15-13.30 |                                                                    | Lunch                                                                     |                                           |
|                                     | 13.30-14.15 |                                                                    |                                                                           | A. Geist, <i>KIT</i>                      |
|                                     | 14.15-15.00 |                                                                    |                                                                           | L. Flint, <i>NNL</i>                      |
|                                     | 15.00-15.30 |                                                                    | Coffee break                                                              |                                           |
|                                     | 15.30-16.15 |                                                                    |                                                                           | B. Dinh, <i>CEA DEN</i>                   |
|                                     | 16.15-17.00 |                                                                    |                                                                           |                                           |
|                                     | 17.00-17.45 |                                                                    |                                                                           |                                           |
| Thursday 16/05                      | 9.00-9.45   | Visit + Tutorials                                                  | RID research reactor tour                                                 |                                           |
|                                     | 9.45-10.30  |                                                                    |                                                                           |                                           |
|                                     | 10.30-10.45 |                                                                    | Coffee break                                                              |                                           |
|                                     | 10.45-11.30 |                                                                    | Tutorial on Fuel Performance Codes (1h30 - half of the group)             |                                           |
|                                     | 11.30-12.15 | Fuel cycle in MSRs                                                 |                                                                           |                                           |
|                                     | 12.15-13.30 |                                                                    | Lunch                                                                     |                                           |
|                                     | 13.30-14.00 |                                                                    | QUIZZ                                                                     | 30 min                                    |
|                                     | 14.00-14.45 |                                                                    | MSR concept and fuel cycle                                                | J.L. Kloosterman, <i>TU Delft</i>         |
|                                     | 14.45-15.30 | Case studies                                                       | Fuel fabrication, fuel chemistry and in-reactor behaviour                 | E. Capelli, <i>ENEA</i>                   |
|                                     | 15.30-16.00 |                                                                    | Coffee break                                                              |                                           |
|                                     | 16.00-16.30 |                                                                    | Case study: MOX in fast reactors                                          | R. Vauchy, <i>CEA DEN</i>                 |
|                                     | 16.30-17.00 |                                                                    | Case study: (U,Am)O <sub>2</sub> and JOG chemistry in fast reactors       | E. Epifano, <i>Onera</i>                  |
|                                     | 17.00-17.30 |                                                                    | Case study: Fuel performance codes in fast reactors                       | D. Pizzocri, <i>Politecnico di Milano</i> |
|                                     | 17.30-20.00 |                                                                    | School BBQ                                                                |                                           |
| Friday 17/05                        | 9.00-9.55   | Fuel reprocessing, recycling and radioactive waste (Part II)       | Reprocessing of metallic fuels and pyrochemistry                          | J. Serp, <i>CEA</i>                       |
|                                     | 9.55-10.50  |                                                                    | Radiolytic effects/radiological issues on the performance of reprocessing | H. Galan, <i>CIEMAT</i>                   |
|                                     | 10.50-11.05 |                                                                    | Coffee break                                                              |                                           |
|                                     | 11.05-12.00 |                                                                    | Dissolution issues                                                        | N. Dacheux, <i>ICSM</i>                   |