

ACADEMIA EUROPAEA *KNOWLEDGE HUB* REGION BERGEN (*AEkhRB*)

SUMMER PROGRAMME 2015:

YEARLY EVENTS (OUTREACH TOOLS) ORGANIZED BY AEKHRB
AND ASSOCIATED COLLOQUIA

I - REGIONAL MEMBERS' MEETING AND "CONSENSUS"
I A - ASSOCIATED COLLOQUIA – LINKED TO I

II - NorSAC 2015
II A - ASSOCIATED COLLOQUIA – LINKED TO II

Bergen 17 June

Venue: Grand Selskapslokaler, Spisesalen
(Bergen Chamber of Commerce and Industry)

14:00-17:00

I.1 Regional Members' Meeting (RMM)

Presentation of Hub Themes for comments and suggestions:

J.S.Vaagen (Hub AcaDir MAE), 15 minutes.

Short presentations of selected Projects:

K. Ytre-Hauge (UiB), O.A. Misund (MAE), S.E. Larsen (MAE), 45 minutes.

Special Theme- The Arctic Dimension:

Energy; L.P. Csernai (UiB MAE), *Environment*; E. Jansen (UiB MAE), *Law*; E. Nordtveit (UiB)
3 x 15 minutes.

Time in between for mingling.

18:00-20:00

I.2 CONSENSUS 2015

Public discussion in the spirit of the Nordic Model – analogue to Barcelona's DISPUTATIO
Open Public Meeting.

Theme and Question: The Nordic Model is generally understood as a social system blending a market economy with a robust welfare system. **Is the Nordic model fading – outdated?** What do we learn from Piketty?



Chair: S. Cloetingh (AE President): Opening remarks for CONSENSUS-2015
Convener (Co): K. Moene (UiO, MAE): Profiling Theme and Question (20 minutes).

CONSENSUS Panel: Moderator=Convener, X (F.H. Aarebrot, UiB), Y (R. Hannesson, NHH).
Debate between X and Y moderated by Co (40 minutes max).

Contributor: Alf Erling Risa (UiB)
Contributor: Eirik Schrøder Amundsen (UiB)

Questions from Audience to CONSENSUS Panel (20 min).

Closure of CONSENSUS-2015 by Chair

SHORT NARRATIVE (SUMMARY) by AcaDir Vaagen

Offshore Northern Seas activities have underpinned Nordic Model Practice in Northern Europe. After the drastic drop in oil price last year, addressing the CONSENSUS question "Is the Nordic Model fading - outdated?" was very timely, with new lessons learned.

The site of the event was the Bergen Chamber of Commerce. The convener K. Moene (UiO, MAE) and the debaters F. Aarebrot (UiB) and R. Hannesson (NHH), the latter born in Iceland, are all well-known; From science - linked to the Nordic Model, from leading Norwegian newspapers and from TV. They created an exciting atmosphere and a challenging exchange of viewpoints, including the role of technology development.

A consensus was reached that in times that are a' changin' (Bob Dylan), the Nordic model still provides a standard for better understanding what is going on.

With the AE board and former AE president Lars Walløe present, and contributors to the associated three day programme, CONSENSUS 2015 became an informative scientific colloquium, but still interesting for a wider audience. Invited contributors among the audience helped to sharpen the questions. So did the contributions from members of YAE.



ASSOCIATED PROGRAMMES - related to the Hub's Themes and Projects

IA - June 15-18 COLLOQUIA linked to RMM, CONSENSUS and AE Board meetings

15-16 June: Joint YAE/AE symposium on clean energy and climate modeling

Lynn Kamerlin (Uppsala U.): Welcome and introduction to YAE, and recent activities

Inga Berre (U. Bergen): Geothermal Energy

Sveinung Hagen (Statoil): Carbon capture and storage

Break

Nedjlejka Zagar (U. Ljubljana): Atmospheric energy distribution and climate models

Bjørn Olav Brandsdal (U. Tromsø): Hunt for living gold, Enzymes, extreme environments

Jonatan Klaminder (Umeå U.): Fishy behavior

16 June

Lynn Kamerlin (Uppsala U): Research reward, recognition and excellence: The example of Biomedicine

Joeren van der Sluijs (U. of Bergen): Decades of climate research, lessons for science.

André Mischke (Utrecht University): Matter of the early universe.

Eldar Heide (University of Bergen): Textual Information on Viking Age Maritime Technology

16 June, a.m.: EASAC/JRC meeting on Nuclear Energy and Management of Spent Fuel

Jan S. Vaagen (Academic Director, AE Bergen Hub) Introduction & welcome by host:

Ole Didrik Lærum (EASAC Scientific Council) Presentation of EASAC

Dóra Dudás (Project Officer, JRC-EC, Brussels) Presentation of JRC,

Ákos Horváth (EASAC & dir. Center for Energy Research, Hungary) Nuclear Energy in Europe

Gunnar Buckau (EC) Presentation of the Council Directive (2011/Euratom) Community framework for the responsible and safe management of spent fuel and radioactive waste

Break

Pierre Kockerols, Senior Expert - Nuclear Safety and Security, Joint Research Centre, European Commission) Presentation of the joint report of EASAC and JRC on the "Management of the Spent Nuclear Fuel and its Waste"

Round table discussion / Questions & Answers

Chair: Laszlo P. Csernai (AE Council)

Øivind Berg (Senior Advisor, Institute for Energy Technology, Halden reactor, Norway)

Gunnar Buckau (Inst. for Trans uranium Elements, Joint Research Center – European Commission)

Selected talks are available at the <http://acadeuro.b.uib.no/activities/meetings/> website.

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Bergen 29 July

Venue: Institute of Physics and Technology (IFT), UiB AUD B
09:00-17:00

II: NorSAC 2015

NorSAC 2015 – Northern Seas Achievement Colloquium – Colloquium to highlight Hub mission-related scientific achievement or achievement related to strengthening interplay between Northern Seas countries.

EXPLORING THE SHORELINES OF FUNDAMENTAL MATTER

Lessons of the Russian-Nordic-British Theory (RNBT) Collaboration after 25 years (1990-2015)

IFT UIB

Programme

Chair: L.P. Csernai (Bergen MAE)

Øyvind FRETTE, Chair of Department (IFT): Welcome address

09:15 - 09:30

Auditorium B, Allegaten 66, Bergen

Morning: J.S. Vaagen (Bergen) MAE: Forming RNBT-Paradigmatic Lessons, Shore (Drip)-line Architecture

09:30 - 10:00

Auditorium B, Allégaten 66, Bergen

Morning: M.V. Zhukov (Göteborg, Kurchatov): Hindsight on RNBT Scientific Highlights

Chair: Csernai

10:00 - 10:30

Auditorium B, Allégaten 66, Bergen

Break

10:30 - 10:45

Bergen, Norway

Morning: D. Gridnev (FIAS, Frankfurt am Main): Magic of Few-Body Systems

Chair: Strottman

10:45 - 11:15

Auditorium B, Allégaten 66, Bergen

Morning: Questions, Remarks and Discussion involving the NorSAC Audience

Chair: Strottman

11:15 - 11:45

Auditorium B, Allégaten 66, Bergen

Lunch Break

11:45 - 13:00

Bergen, Norway

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Afternoon: E. Osnes (Oslo) MAE: Nordic Nuclear Theory in Retrospect

Chair: Röhrich

13:00 - 13:30

Auditorium B, Allégaten 66, Bergen

Afternoon: C. Joas (Copenhagen): Many-Body Physics in the 1950s and 1960s.

Chair: Röhrich

13:30 - 14:00

Auditorium B, Allégaten 66, Bergen

Afternoon: R. Leonardi (Trento): European Visions and Birth of ECT* in Trento

Chair: Röhrich

14:00 - 14:30

Auditorium B, Allégaten 66, Bergen

Break

14:30 - 15:00

Bergen, Norway

Afternoon: S. Ershov (JINR, Dubna): Excursion into Borromean Continuum

Chair: Cheng

15:00 - 15:30

Auditorium B, Allégaten 66, Bergen

Afternoon: G. Hagen (Oak Ridge Nat. Lab.): Advances in Coupled-Cluster Computations of Nuclei

Chair: Cheng

15:30 - 16:00

Auditorium B, Allégaten 66, Bergen

Afternoon: D.D. Strottman (Fellow, Los Alamos Nat. Lab.): Perspectives of Nuclear Theory from Los Alamos

16:00 - 16:30

Auditorium B, Allégaten 66, Bergen

Break:

16:30 - 16:45

Bergen, Norway

Afternoon: L.P. Csernai (Bergen) MAE: What will the Future Contain?

Chair: Vaagen

16:45 - 17:30

Auditorium B, Allégaten 66, Bergen

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NARRATIVE (SUMMARY)

Reporters (V&Z): J.S.Vaagen (Bergen, mae) & M.V. Zhukov (Göteborg/Moscow)

RNBT and the Borromean Paradigm

*The letters **RNB** in the acronym RNBTheory have a dual interpretation: A Regional; Russian-Nordic-British and a Topical; Radioactive Nuclear Beam, - theory aimed at studies of the architecture of the nuclear stuff at the drip-lines where atomic nuclei dissolve.*

*The collaboration is associated with **Borromean** nuclei. It coined this name, chose the three Borromean rings as logo and developed successful quantum theory for the architecture of exotic three-body halo nuclei at the shore-lines of fundamental matter. In physics the rings now represent a **paradigm**, an analogue model that helps understand formation of exotic structure of composite quantum matter. Annually numerous new references to the Borromean concept are made.*

*NorSAC portrayed a team of **theorists**. Theorists are no longer necessarily lonely wolves who expect a one way relation where the experimentalists come to them for advice.*

*The RNBT story could not have been told unless the **experimentalists** had become close partners. Neither could it without complementary insights and gifts in the theory team, including ability to communicate with the experimental community.*

Learning how to collide nuclei in Big Science accelerators, in particular the art of using radioactive secondary beams, has during the last decades taught us how to manipulate the nuclear stuff, how to subject it to extreme conditions. Harvesting from the shore-lines of the nuclear territory has challenged and enriched our understanding of the nuclear stuff - and the venture is far from completed.

GENCO Award

*In 2004 V&Z, the two now oldest living RNBT pioneers, were awarded The **GS1 Exotic Nuclear Community Membership Award** in Darmstadt, for*

“Basic Contributions to the Theory of Exotic Nuclei and the Realization of the Borromean Principle in the Organisation of the West-East Collaboration”. How is the latter part to be understood?

RNB is a purpose directed collaboration (alliance) of three partners R&N&B based on complementary competence: Three Partners (Constituents) where each one needs the other two for reaching a certain overarching goal. Thus it is not favourable for any two to break away and form a binary alliance. The structure follows that of *The Three Musketeers*, One for all, all for one, i.e. the **Borromean binding principle**: A stable 3C linked architecture of 3 Constituents (Clusters), without any binary (2C) stable links. Each Partner may contain a number of member institutions, free to move in and out as long as the overarching competence is maintained. This gives flexibility, and a mechanism for fertilizing the society with RNB ideas, with proper reference expected. Students and Young scientists in substantial numbers have got training within RNBT, free to later leave, even to serve competitors.

Such Partner rights simplify work with experimentalists and laboratories, which often have their own house theorists. The Borromean “democratic” principle was important in the formation of RNBT during the *perestroika* in Russia (Soviet Union).

Formation of RNBT in Turbulent Times

In 1987 RNBT pioneers **Bang** (Copenhagen) & **Vaagen**, wrote a letter to Gorbachev from the international centre JINR in Dubna, where they were guest researchers. The letter reminded Gorbachev of the glasnost in the early 1920s when famous Russians like Landau and Kapitsa had research stays in Bohr’s Copenhagen, and emphasized the advantages of returning to less restricted foreign travel as part of the *perestroika*. This would also ease the collaborative work of RNBT pioneers, who had already met frequently in Copenhagen and Dubna during the past decade.

The RNBT pioneers considered themselves mainly as quantum reaction theorists with few-body cluster competence. In 1985, the **Tanihata** group at Berkeley had discovered exotic light nuclei of gigantic size, produced in secondary radioactive beam experiments. The observation had only attracted attention from a small part of the theory community.

*The structure was still not understood in 1987, when the idea that the Berkeley discovery was caused by a **nuclear halo**, was put forward by Jens **Bang** in a lunchroom conversation in Copenhagen with the experimentalists P. Gregers **Hansen** (Aarhus) and Björn **Jonson** (Göteborg, mae). Using a simple model, the two turned the idea into a Europhysics Letters, with proper reference to the discussion with Bang, and to Russian pioneering work by Migdal and Efimov.*

Thus the name halo nuclei came into being, what remained was a proper quantum mechanical explanation, in particular for halos with two nucleons, which required a 3-body treatment, in general considered notoriously difficult. This became the homefield of RNBT, a self-organized structure of friends, that grew in size.

*The name **Borromean** appeared in RNBT's most cited publication, **Physics Reports 231(1993)**, having already been used internally in the team. In NorSAC 2015 **Vaagen** and **Zhukov** outlined the formation of RNBT and paradigmatic lessons, and gave hindsight on scientific highlights, all in a style accessible for a wider audience. The youngest of the pioneers present, **Sergey Ershov** (Dubna), gave a perspective on running investigations of the Borromean continuum – open quantum systems.*

*Professors **Eivind Osnes** (Oslo, mae) and **Renzo Leonardi** (Trento) positioned RNBT in the Nordic theory context, the role of NORDITA, and in the creation of the European theory centre ECT* in Trento 1992/93. The great success of ECT* calls for a comprehensive historical hindsight.*

*Late RNBT pioneers **Jens Bang** (Copenhagen), **Boris Danilin** (Moscow), **Fangil Gareev** (Dubna), **Valery Zagrebaev** (Dubna, mae) and **Konstantin Gridnev** (St. Petersburg) were remembered.*

Models and Dilettantes

The inner dynamics of the creative Copenhagen environment in Bohr's Mecca for quantum physics, and its open society philosophy, underpinned the formation and running of RNBT.

*The physicist **Thomas Bohr**, grandson of Niels Bohr, emphasizes in a contribution to the article collection 'The atomic model 100 years' (2013), that his grandfather, inspired by the British science tradition, often liked to describe his own approach to science as that of a dilettante,*



derived from the Italian dilettare - to delight or amuse. The joy of nature and the fresh approach to the study of it - without too much erudition - was important to him. Niels Bohr placed himself as a connecting link between the systematic German school and the British. He wanted to base his science on fundamental principles, but if an issue was sufficiently important, one had to take it up and "do something" even though one may not yet know the ultimate principles. RNBT followed in Bohr's footsteps, now assisted by proper quantum mechanics.

The development of models and analogies became a crucial aspect of Bohr's theorizing, rooted in philosophical influence from very early in his life. The inventive dilettante goes, however, beyond simple copying. Bohr showed that, when he laid the ground for his first quantum architecture for the atom. Bohr historian John Heilbron made in 1977 the point that in addition to choosing the right constituents, those of Rutherford, probably the chief driving force for young Bohr (1913) was to provide binding for atoms known to be stable, knowing that the classical Saturnian atom model was mechanically unstable. At nuclear driplines RNBT showed that a Borromean quantum model provides binding for exotic halo nuclei which exhibit emergent cluster degrees of freedom.

Young Experts - Young Voices

Christian Joas (NBA, Copenhagen), Gaute Hagen (ORNL,US) and Dmitry Gridnev (FIAS, Frankfurt), the latter two with RNBT degrees from Bergen, linked the colloquium to history of science and creative environments, to ab-initio calculations of many-body systems on super-computers and to the magic of few-body systems. They were voices for a young generation which takes the work further, in collaborative non-Borromean settings dictated by the realities of our times. YAE may provide a suitable framework for bringing them together.

Their contributions to NorSAC gave promises for a bright future.

RNBT has been blessed with having had a number of exceptional students, some strongly visible nowadays in the original field, some choosing their own way, in companies or like James Al'Khalili (Guildford), now a profiled BBC science communicator, and Danas Ridikas now at IAEA & Saclay, involved in energy questions and non-proliferation.

The Trans-Atlantic Connection

*A substantial part of the RNBT related action has in recent years moved to the USA: The UK pioneer Ian **Thompson** to LLNL, and as already mentioned Hagen to ORNL hosting Nordic visitors. NorSAC was fortunate to have Professor D. **Strottman** from LANL as last speaker. His wide experience from theory leadership, and science work on matter under extreme conditions from low to high energies, provided the colloquium with a global outlook.*

*A two-day very successful tail-part to NorSAC, open for participants and organized by the Chair L.P. **Csernai**, gave up-to-date insight in the role of nuclear beams and radiation in our understanding of both the early and present Universe, including particle therapy (R. **Leonardi**) with the recent proton facility in Trento as example.*

*Vaagen started the NorSAC colloquium by telling the story of **Herbert Curien**, French Minister of Science and Technology, arriving in Cambridge UK by helicopter in September 1988, to give the inaugural address in the Foundation Meeting for Academia Europaea. Vaagen drew attention to the close relations between Curien and D. **Allan Bromley**, White House Science Advisor for the George Bush Sr. administration (1989-93), Yale professor (and Vaagen's boss in the 70s'). Curien and Bromley shared concern about changing times for science, and for the outcome of the perestroika in Russia. The situation was better in Japan, which entered as a big player in dripline physics, in particular after Tanihata returned home. Thus RNBT had to address experimental results provided by Europe, US and Japan, and RNBT used the NorSAC opportunity to thank the experimentalists for the glasnost that made it possible to develop the field.*

Northern Seas Alliances - past and future

Northern Seas alliances date more than 1000 years back. They were facilitated by the development of seafaring ships, for peace - trading routes, and for war. They linked Northern Seas and Russian rivers, and exchange with Mediterranean Europe and the Muslim world. The Northern

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Seas history is one of joint ventures, alliances involving young people and intermarriage, also to make alliances last.

In 1998 Vaagen and Zhukov were made honorary professors at the University of St. Petersburg, created by Peter the Great 275 years earlier. In 1698 on his first trip West, the young tsar while in Amsterdam, head-hunted Cornelius Cruys to create and build a Russian fleet for Northern Seas. He gave him rank of vice-admiral. A copy of one of the frigates (1703), the "Shtandart" sails the seas today. Two weeks before the NorSAC event it visited Stavanger, Norway where Cruys was born and given the more modest name Niels Olufsen.

We V&Z, the oldest living of the RNBT pioneers, are proud to be linked to a city, which in spite of great sacrifices during its construction, bound Europe more tightly together: Also in academia by creating a Russian Academy of Sciences which started the development that made Russia an outstanding academic partner. Science is a tool for keeping an open world, for uniting - not dividing. A lesson emphasized by Bohr and repeated at NorSAC2015 and to be remembered in our again turbulent times.

NorSAC 2015 was attended by about 50 participants, from Europe, America and Asia, and the tail-part by about half that number. From these there were 32 registered scientists, and several other dignitaries. About a dozen Members of AE participated. The meeting included two social dinners and a joint excursion to the Hardanger fjord.

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ASSOCIATED PROGRAMMES - *related to the Hub's Themes and Projects*

IIA - July 30-31 COLLOQUIA linked to NorSAC 2015

Thursday 30 July 2015

Chair: Bravina, Larisa MAE (University of Oslo (NO))

Morning: STROTTMAN, Daniel – The Three-Dimensional Relativistic Hydro PIC Code I

Morning: CHENG, Yun - Hybrid models for relativistic Heavy Ion Reactions

Morning: LEONARDI, Renzo (ECT*) - Hadron Therapy

Break

Chair: WANG, DuJuan

Morning: BARNAFOLDI, Gergely: The Soft+hard Model-an Application Non-extensive Statistics

Morning: ZABRODIN, Evgeny: Elliptic and triangular flows in Pb+Pb collisions at LHC

Lunch Break

Chair: Barnaföldi, Gergely

Afternoon: VELLE, Sindre - Two particle correlations

Afternoon: XIE, Yilong - Lambda Polarization in an exact rotating and expanding model for peripheral heavy ion reactions

Afternoon: KOPELIOVICH, Boris: Charmonium suppression in a cold medium

Friday 31 July 2015

Chair: Zabrodin, Evgeny (University of Oslo (NO))

Morning: BRAVINA, Larisa - The Hyjet++ model of heavy ion reactions

Morning: WANG, Dujuan - Rotation, Flow vorticity and Lambda polarization in pHiC

Morning: CSERNAI, Laszlo - Collective dynamics, in relativistic heavy ion collisions

Break

Chair: Kopeliovich, Boris

Morning: PAPP, Istvan - Inertial Confinement Fusion - Radiation Dominated Implosion

Lunch Break

Chair: Csernai, Laszlo

Afternoon: STROTTMAN, Daniel - The Three-Dimensional Relativistic Hydro PIC Code II.

Afternoon: KOPELIOVICH, Boris: Charmonium suppression in a hot medium

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Prof. Jan S. Vaagen, Hub Academic Director (AcaDir)

Vidar Totland, Hub Business Coordinator