<table>
<thead>
<tr>
<th>Week day</th>
<th>Month/day</th>
<th>Time</th>
<th>Speaker</th>
<th>Title</th>
<th>Institute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thursday</td>
<td>21/1</td>
<td>14:30</td>
<td>Robert Nitsch</td>
<td>Imaging damage and cell death in the nervous system</td>
<td>University of Mainz</td>
</tr>
<tr>
<td>Thursday</td>
<td>28/1</td>
<td>15:00</td>
<td>Till Dettmering</td>
<td>Investigation on the radiation-induced accumulation of reactive</td>
<td>TUD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>oxygen species in human fibroblasts</td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td>11/2</td>
<td>15:00</td>
<td>Diana Pignalosa</td>
<td>Influence of relative positioning of human cell nuclei and heavy ion</td>
<td>GSI</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>tracks on the formation of chromosomal rearrangements</td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td>18/2</td>
<td>15:00</td>
<td>Chiara La Tessa</td>
<td>Evaluation of in-field and out-of-field dose in MATROSHKA for a</td>
<td>GSI</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>standard cancer treatment</td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td>25/2</td>
<td>15:00</td>
<td>Alexander Helm</td>
<td>Effects of heavy ions and x-rays on human endothelial cells</td>
<td>HDa</td>
</tr>
<tr>
<td>Thursday</td>
<td>4/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monday</td>
<td>15/3</td>
<td>15:00</td>
<td>Antonio Giordano</td>
<td>Therapeutic targets of cancer</td>
<td>Temple University, USA</td>
</tr>
<tr>
<td>Thursday</td>
<td>18/3</td>
<td>15:00</td>
<td>Itzhak Nelson</td>
<td>Treatment of solid tumors by interstitial release of recoiling</td>
<td>Tel Aviv University, Israel</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>short-lived α-emitters</td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td>25/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td>1/4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friday*</td>
<td>9/4</td>
<td>14:00</td>
<td>Avraham Dinlanman</td>
<td>Microbeam radiation therapy</td>
<td>BNL, USA</td>
</tr>
</tbody>
</table>

$ in the FIAS seminar room, Ruth-Moufang-Str. 1, Frankfurt
* in the GSI Hörsaal, ground floor
Report on 2009 meetings

MD (ERRS, NuPECC, MELODI, Israel workshop)
GTS (RRS)
CB (WCMP)
GK (PTCOG)
CF (GBS)
MS (Microdosimetry)
37th Annual Meeting of the European Radiation Research Society

Dates: 26-29th August 2009
Location: Prague, Czech Republic
<table>
<thead>
<tr>
<th>topic of section</th>
<th>keynote speakers</th>
<th>chairmanship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiation Physics</td>
<td>Hooshang Nikjoo, Stockholm</td>
<td>Hooshang Nikjoo, Stockholm Friedo Zölzer, České Budějovice</td>
</tr>
<tr>
<td>DNA repair</td>
<td>Penny Jeggo, Brighton</td>
<td>Penny Jeggo, Brighton Jilina Vávrová, Hradec Králové</td>
</tr>
<tr>
<td>Molecular targets for radio-enhancement, radiation sensitivity</td>
<td>Hans Peter Rodemann, Tübingen</td>
<td>Hans Peter Rodemann, Tübingen Georges Don Jones, Leicester Friedo Zölzer, České Budějovice</td>
</tr>
<tr>
<td>Genetic instability, bystander effect and radio-adaptation</td>
<td>Munira A. Kadhim, Oxford</td>
<td>Munira A. Kadhim, Oxford Oleg Belyakov, Helsinki Jan Österreicher, Hradec Králové</td>
</tr>
<tr>
<td>Stem cells</td>
<td>Jaroslav Mokrý, Hradec Králové</td>
<td>Jaroslav Mokrý, Hradec Králové Jilina Vávrová, Hradec Králové</td>
</tr>
<tr>
<td>Biological dosimetry</td>
<td>Laurence Roy, Fontenay aux Roses</td>
<td>Laurence Roy, Fontenay Aux Roses Andzej Wojcik, Stockholm Martin Falk, Brno</td>
</tr>
<tr>
<td>Radiation protection,</td>
<td>Aleksandr Nikolaevich Grebenyuk, Sankt Petersburg</td>
<td>Aleksandr Nikolaevich Grebenyuk, Sankt Petersburg</td>
</tr>
<tr>
<td>Radiation oncology</td>
<td>Michael Baumann, Dresden</td>
<td>Michael Baumann, Dresden Karel Odrážka, Pardubice</td>
</tr>
<tr>
<td>Normal tissue damage</td>
<td>Catherine West, Manchester</td>
<td>Catherine West, Manchester Wolfgang Dörr, Dresden Friedo Zölzer, České Budějovice</td>
</tr>
<tr>
<td>Non-ionizing radiation</td>
<td>Leonardo Longo, Firenze</td>
<td>Leonardo Longo, Firenze Leoš Navrátil, České Budějovice, Kladno</td>
</tr>
<tr>
<td>Radioecology</td>
<td>Dmytro Grodzinsky, Kiev</td>
<td>Dmytro Grodzinsky, Kiev Synnöve Sundell-Bergman, Stockholm Jiří Škopek, České Budějovice, Praha</td>
</tr>
<tr>
<td>Heavy ions</td>
<td>Marco Durante, Darmstadt</td>
<td>Marco Durante, Darmstadt Lorenzo Manti, Napoli Jan Österreicher, Hradec Králové</td>
</tr>
</tbody>
</table>
Soid cancers in the Chernobyl liquidator’s cohort

- Cohort: nearly 60,000 subjects and 2,718 solid cancer cases
- Dose range 1-500 mGy, mean dose 0.13 Gy
- From the mathematical model ERR=0.96 [0.3-1.7] Gy$^{-1}$ and T=4 [3.3-4.9] years
- For comparison A-bomb survivors has ERR = 0.38 (M) or 0.77 (F) Gy$^{-1}$ and T>10 years
- N.B. population very heterogenous, dominated by thyroid cancers (breast marginally significant)
- Childhood thyroid cases: about 5000 up to know (15 fatal)
- Shorter latency for thyroid cancer? Have chromosome-aberration related cancers (leukemia…) shorter latency?
Cancer stem cells (Michael Baumann)

- Take dose 50% assay – TD50=average number of tumor cells required for tumor formation in 50% of the recipient animals
- TCD50= dose necessary to control 50% of the tumors

1. Is CD133+ a good marker of stemness?
2. No in vivo data on radioresponse of stem cells
3. Dose the increase in CD133+ after radiation reflect radioresistance or greater proliferation capability?
4. Increased radioresistance of CSCs is NOT proven
NuPECC Long Range Plan 2010
The goal of the Nuclear Physics Forward Look LRP2010 is to bring together the entire Nuclear Physics community in Europe to formulate a coherent plan how best to develop the field in the next decade and beyond.

Proposal for a Forward Look on Nuclear Physics (pdf)
Working Groups

Workshops and Conferences
Scoping Workshop at FIAS in Frankfurt - Agenda (pdf)
General Presentations
Reports from Working Groups
Consensus Conference (Town Meeting) at CSIC in Madrid 31/5 - 2/6/2010
## Nuclear Physics Forward Look LRP2010 Working Groups

<table>
<thead>
<tr>
<th>Working Group</th>
<th>Convenor</th>
<th>NuPECC Steering Committee Member</th>
<th>NuPECC Working Group Member</th>
</tr>
</thead>
<tbody>
<tr>
<td>Madron Structure and Spectroscopy</td>
<td>Ulrich Wiedner</td>
<td>Guenther Rosner</td>
<td>Jochen Wambach</td>
</tr>
<tr>
<td>Phases of Strongly Interacting Matter</td>
<td>Paolo Gubellino</td>
<td>Jens Jørgen Gaardhøje</td>
<td>Thomas Petzmann</td>
</tr>
<tr>
<td>Nuclear Structure and Dynamics</td>
<td>Rauno Julin</td>
<td>Angela Bracco</td>
<td>Maria Borge</td>
</tr>
<tr>
<td>Nuclear Physics Tools and Applications</td>
<td>Sylvie Leray</td>
<td>Paul-Henri Heenen</td>
<td>Sotiros Harissopulos</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nicholas Chamal (Bruxelles)</td>
<td>Zsolt Fulop (Debrecen)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Working Group Members: Nicholas Chamal (Bruxelles)</td>
<td>Zsolt Fulop (Debrecen)</td>
</tr>
</tbody>
</table>

### Nuclear Astrophysics
- Brian Fulton
- Michael Heil (GSI)
- Jordi José (Barcelona)
- Francois de Oliveira (GANIL)
- Gabriel Martinez Pinedo (GSI)
- Paolo Prati (Genova)
- Thomas Rauscher (Basel)
- Stefano Romano (Catania)
- Kerstin Sonnabend (Darmstadt)
- Christof Vockenhuber (Zürich)
- Phil Woods (Edinburgh)
- Eberhard Widmann
- Klaus Jungmann

### Fundamental Interactions
- Nathal Sevrijens
- Working Group Members:
  - Roberto Calabrese (University and INFN Ferrara)
  - Guido Drexlin (Universität und FZ Karlsruhe)
  - Dezso Horvath (KFKI Budapest)
  - Klaus Kirch (PSI Villigen)
  - Krzysztof Pachucki (University of Warsaw)
  - Fabrice Piquemal (CENBG, IN2P3-CNRS et Université de Bordeaux)
  - Stefan Schönert (MPI-K Heidelberg)
  - Rob Timmermans (RU and KVI Groningen)
  - Cristina Volpe (IPN Orsay)
  - Oliver Zimmer (ILL Grenoble)
- Philippe Chomaz
- Eugenio Nappi

### Working Group Members:
- José Benlliure (University of Santiago de Compostela)
- Andrew Boston (University of Liverpool)
- Marco Durante (GSI Darmstadt)
- Santo Gammino (INFN-LNS Catania)
- Joaquim Gomez Camacho (CNAO Sevilla)
- Mark Huyse (Leuven)
- Jan Kucera (Nuclear Physics Institute Rez)
- Philippe Moretto (CENBG Bordeaux)
- Lembit Silver (Chalmers University)
- Christina Trautmann (GSI Darmstadt)
NuPECC – Long Range Plan 2010

Working Group 6

Nuclear Physics Tools and Applications
Objectives of WG6

- State the importance of NP applications (transfer of knowledge, benefits for the society and for the community, improve public perception, training of engineers, doctors, technicians...)
- Review recent achievements in the field and the current state of the art: strengths / weaknesses.
- Identify open problems and new issues: opportunities / threats
- Develop medium and long-term strategies to tackle them
- Optimise interplay between fundamental physics and application end-users (identify present and potential clients and their expectations for each field). Analysis the various application dynamics: client, discovery, technology-driven
- Develop the European and worldwide perspective of the field, identifying synergies

Formulate recommendations (support to existing facilities, interest of the future facilities, development of new techniques, structuring of the community, human resources) and suggest action plan
List of domains/sub-groups (1)

1. Nuclear energy (*J. Benlliure*, *L. Sihver*, *M. Huyse*, *SL*, …)
   - Fission: Generation IV reactors, transmutation of nuclear waste, accelerator-driven sub-critical reactors (nuclear data, detector development, HI accelerators…)
   - Fusion: magnetic confinement, inertial confinement, IFMIF (technological developments, instrumentation, activation data…)
   - Other energies: oil prospection, …

2. Life science and radioprotection (*M. Durante*, *A. Boston*, *Ph. Moretto*, *E. Nappi*, *S. Gammino*, , *L. Sihver*, *SL*…)
   - Imaging (diagnostics, therapy, research) (*NMR, SPECT, PET*)
   - Photon and charged particle tumor therapy
   - Radiopharmaceutical element production and use
   - Nuclear Genomics
   - Sterilization
   - radioprotection

3. Environmental and space applications (*L. Sihver*, *A. Boston*, *J. Gomez-Camacho*, *Ph. Moretto*, *M. Durante*…)
   - climate change monitoring,
   - water resources, air quality
   - radioecology,
   - space applications
List of domains/sub-groups (2)

4. State security (A. Boston, J. Benlliure, SL, …)
   - Detection of fissile materials
   - Detection of explosives, mines
   - Non-proliferation

5. Materials sciences and study of materials for industry (M. Huyse, C. Trautmann, J. Kucera, J. Gomez-Camacho, S. Gammino, …)
   - Material characterization
   - Material modification, ion implantation
   - Material damage study

6. Cultural heritage, arts and archaeology (J. Gomez-Camacho, S. Gammino, …)
   - Dating
   - Elemental analysis

7. NP tools applied to other fundamental research domain (C. Trautmann, …)
   - Atomic physics,
   - Nanoscience

8. New frontiers in NP tools (accelerators, detectors, computing, microelectronics…(S. Gammino, …)
WG6 – Key questions

• **SG1: Nuclear energy**
  
  KQ: How can the NP community help increase the sustainability of nuclear energy generation and safety?
  
  o **Fission**: help solve the problem of nuclear waste, contribute to increase reactor safety, better use of fuel resources
  
  o **Fusion**: help solve the issue of material damage and activation, help develop a feasible and cost effective technology for fusion power plants

• **SG2: Health science**
  
  KQ: New methods for producing radioisotopes, new isotopes

  KQ: How to improve simulation codes for hadrontherapy?

  KQ: Best particle for cancer therapy?

  KQ: How to improve the quality of imaging technologies based on NP methods decreasing the dose to the patient?

• **SG3: Environmental and space applications**
  
  KQ: Can we go to Mars?

  KQ: How NP can help in monitoring natural and artificial radioactivity and climate change?
WG6 – Key questions

- **SG4: State security**
  - **KQ:** Which new, or modifications of existing, NP tools are needed to cope with new requirements regarding homeland security?

- **SG5: Material science**
  - **KQ:** Testing and characterisation of materials to be used in extreme conditions
  - **KQ:** Can we explore ultra-fast processes induced by high-energy ions?

- **SG6: Cultural heritage, arts and archaeology**
  - **KQ:** How to improve non-destructive in-depth analysis?

- **SG7: NP tools applied to other fundamental research domain**
  - **KQ:** How can NP help understanding history of minerals in geoscience?

- **SG8: New frontiers in NP tools**
  - **High-intensity accelerators for Accelerator Driven Subcritical Reactors (ADSRs), ISOL based facilities, and Spallation Neutron Sources (ESS)**
  - **Radiation hard, fast detectors with low material budget for use for accelerator beam diagnostics and beam loss monitors**
High Level Expert Group
on European Low Dose Risk Research

The HLEG is an initiative of representatives of six national bodies (with a policy interest or substantial research activities in low dose risk research) and the EURATOM research programme.

The objectives of the HLEG are:

- To formulate and agree the policy goals to be addressed by low dose risk research;
- To develop a strategic research agenda and road map for low dose risk research in Europe;
- To specify the essential elements of and next steps for establishing a sustainable operational framework for low dose risk research in Europe.

Further details are given in TOR of the HLEG.

The HLEG has decided that public consultation on the draft report should take place prior to final publication. The consultation process has closed. The final report is now available.
How robust is the system of radiation protection and risk assessment?

Shape of dose response
- LNT
  - Linear non-threshold
  - Dose rate

Tissue sensitivities
- $\omega_T$
  - Tissue weighting factors

Radiation quality
- $\omega_R$
  - Radiation weighting factors

Internal emitters
- Biokinetic models
- Dosimetric models

Individual sensitivities
- Genetics
- Age
- Gender
- Lifestyle
- Other exposures
- .......

Non-cancer effects
- Circulatory diseases
- Cognitive functions
- Lens opacities
- .......

Radiation Protection System
- Dose limits
- Constraints
- Optimisation
  - Dose as surrogate for risk
  - Additivity
  - Cancer and hereditary effects

Questions:

GSI
Multidisciplinary European Low Dose Initiative

The HLEG Report recommends the setting up of a European Platform dedicated to low dose risk research, called MELODI (Multidisciplinary European Low Dose Initiative).

Five of the national institutions participating in the HLEG have signed a Letter of Intent (LoI) in order to initiate the process of setting up of such a platform.

The process foreseen to set up the MELODI Platform is described in an introductory document setting out the key steps and the expected deliverables.

The Bundesamt für Strahlenschutz (BfS), on behalf of the MELODI signatories, has organized a First MELODI Open Workshop in Stuttgart on September 28th and 29th 2009. 156 scientists, representatives of the regulatory community and interested stakeholders of 23 European countries, USA and Japan took an active part in the workshop and discussed the future development of low dose radiation research in Europe. The presentations, given during the workshop are listed on this website.
MELODI: A Holistic Musical Score
How to Write the Rest of the Music Score?

Three Main Scientific Topics

 Radiation Quality
 Tissue Sensitivity
 Internal/External Exposure

Shape of Dose-Response Curve for Cancer
Individual Sensitivity for Cancer
Non-Cancer Effects

Three Cross-Cutting Scientific Topics

SRA + Implementation Road Map
DoReMi: The First Notes of the Symphony

Network of Excellence to be approved by the EC by the end 2009

WP5
Shape of Dose Response
Simon Bouffler

WP4
Infrastructures
Laure Sabatier

WP1
Network Coordination
Sisko Salomaa

WP6
Individual Sensitivities
Mike Atkinson

WP2
Structuring MELODI
Dietrich Averbeck

WP3
Education and Training
Andrea Ottolenghi

WP7
Non-cancer Effects
Patrick Gourmelon

DoReMi is designed to achieve fairly short term results in order to prove the validity of the HLEG approach, and contribute to the development of MELODI
Respective Roles of DoReMi and MELODI

➡ DoReMi, A Network of Excellence:
  • To develop and implement a “transition research agenda” (TRA) within the limited time frame and organisational perimeters of the NoE
  • To contribute to the wider development of MELODI, notably by bringing its scientific input into the open dialogue of the Platform
  • To take into account the results of MELODI work and SRA for the future calls for R&D actions within the NoE

➡ MELODI, A European Platform:
  • To develop a long term strategic agenda for research and training in Europe on low dose risk issues
  • The SRA and road map should be sufficiently supported by all stakeholders (including the R&D community) to allow the EC and Member States to rely on it to guide EU and national R&D policies
MELODI and DoReMi: complementarity

ENSREG  GB  EC

Scientific Committee

Working Groups

Members

Integrative actions

DoReMi

Other research projects

WHO, IAEA, NEA, DOE, NIRS, ...

MELODI

1st MELODI Workshop
Stuttgart, 28-29 September 2009
PROGRAM:

09:00 - 09:15  WELCOME

09:15 - 10:00  "Interdisciplinary approaches in brain and brain tumor treatments and monitoring"  (abstract)
               Yael Mardor, The Advanced Technology Center, Sheba Medical Center, Israel

10:00 - 10:45  "Enabling molecular imaging in the main imaging modalities, through new generations of radiation detectors"  (abstract)
               Ami Altman, Philips Healthcare, Haifa, Israel

10:45 - 11:15  Coffee break

11:15 - 12:00  "New prospects for early detection of prostate cancer"  (abstract)
               Amos Brezkin, Faculty of Physics, Weizmann Institute of Science, Israel

12:00 - 12:45  "Diffusing alpha-emitters radiation therapy – physics and technology"  (abstract)
               Lior Arazy, School of Physics and Astronomy, Tel Aviv University, Israel

"NUCLEAR PHYSICS APPLICATIONS IN MEDICINE"

6.12.09
Figure 5. Calculated absorbed dose distributions, based on autoradiography measurements with a Fuji phosphor-imaging plate, compared to tissue damage in 10 μm H&E-stained histological sections taken from two SCC tumors. The scale refers to the alpha particle dose delivered by $^{212}$Bi and $^{212}$Po from source insertion until tumor removal (Gy). The dose curves shown: 5, 10, 20, 30 and 50 Gy.
**Figure 4** - Single DART wire experiments: BALB/c mice bearing SQ2 tumors, treated with a single DART wire and monitored for tumor growth and survival. (a-b) Nontreated: Nontreated tumor-bearing mice \((n = 20)\). Inert: Tumor-bearing mice treated with inert wires \((n = 26)\). \(^{224}\)Ra wire: Tumor-bearing mice treated with DART wires \((n = 22)\). Treatment day varied between 7 and 10 days after tumor inoculation and was determined by the time tumors reached the size of \(6-7\) mm (average diameter). (a) Tumor development (standard errors are distinguished by bars). (b) Survival curve. (c-d) Dose-response curve—Inert: Tumor-bearing mice treated with inert wires \((n = 7)\). 7.4 KBq: Tumor bearing mice treated with DART wires delivering the average dose of 7.4 KBq \((n = 8)\). 16.3 KBq: Tumor bearing mice treated with DART wires delivering the average dose of 16.3 KBq \((n = 8)\). 41.8 KBq: Tumor bearing mice treated with DART wires delivering the average dose of 41.8 KBq \((n = 6)\). (c) Tumor growth (treatment day is marked with an arrow and standard errors are distinguished by bars). (d) Survival curve.
<table>
<thead>
<tr>
<th>Time</th>
<th>Grand Hall</th>
<th>Chambermusic Hall</th>
</tr>
</thead>
<tbody>
<tr>
<td>07:00 - 08:00</td>
<td><strong>Knowledge Booster: All you need to know about Particle Therapy</strong> Physics for Physicians</td>
<td></td>
</tr>
<tr>
<td>08:30 - 09:00</td>
<td><strong>Welcome Address</strong></td>
<td></td>
</tr>
<tr>
<td>09:00 - 11:00</td>
<td><strong>Integration of Particle Therapy in your daily clinical routine in the hospital: Is it just another tool or a universal solution?</strong></td>
<td>Workshop for Physicists: „Active beam delivery and gantry concepts“</td>
</tr>
<tr>
<td>11:00 - 11:30</td>
<td><strong>Coffee Break</strong></td>
<td></td>
</tr>
<tr>
<td>11:30 - 13:00</td>
<td><strong>Integrated Clinical Session I: Lung Cancer</strong></td>
<td>Workshop for Physicists: „Active beam delivery and gantry concepts“</td>
</tr>
<tr>
<td>13:00 - 14:00</td>
<td><strong>Lunch Break</strong></td>
<td></td>
</tr>
<tr>
<td>14:00 - 15:00</td>
<td><strong>Modern Principles of Particle Radiation Biology</strong></td>
<td></td>
</tr>
<tr>
<td>15:00 - 15:30</td>
<td><strong>Coffee Break</strong></td>
<td></td>
</tr>
<tr>
<td>15:30 - 17:30</td>
<td><strong>Integrated Clinical Session: Sarcoma</strong></td>
<td>Workshop for Physicists: New devices, models and tools</td>
</tr>
<tr>
<td>17:30 - 19:00</td>
<td><strong>QA in the Era of High-tech Medicine</strong></td>
<td></td>
</tr>
<tr>
<td>from 19:30</td>
<td><strong>Get Together at Heidelberg Castle</strong></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Event</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>07:00 - 08:00</td>
<td>Knowledge Booster: All you need to know about Particle Therapy - Medicine for Physicists</td>
<td></td>
</tr>
<tr>
<td>08:00 - 09:00</td>
<td>Image-Guided Particle Therapy (IGPT) - Interfractional</td>
<td></td>
</tr>
<tr>
<td>09:00 - 09:30</td>
<td>Coffee Break</td>
<td></td>
</tr>
<tr>
<td>09:30 - 10:30</td>
<td>Image-Guided Particle Therapy (IGPT) - Intrafractional</td>
<td></td>
</tr>
<tr>
<td>10:30 - 12:00</td>
<td>Free Communication - New Approaches in Physics and Biology</td>
<td></td>
</tr>
<tr>
<td>12:00 - 13:30</td>
<td>Lunch Break and Poster Viewing</td>
<td></td>
</tr>
<tr>
<td>13:30 - 14:30</td>
<td>What can Medicine Learn from Space Research?</td>
<td></td>
</tr>
<tr>
<td>14:30 - 15:00</td>
<td>Report from Steering Committee, Poster Award Ceremony</td>
<td></td>
</tr>
<tr>
<td>15:00 - 15:30</td>
<td>Coffee Break</td>
<td></td>
</tr>
<tr>
<td>15:30 - 17:00</td>
<td>Integrated Session II: Prostate Cancer</td>
<td></td>
</tr>
<tr>
<td>17:00 - 18:00</td>
<td>Hypofractionation</td>
<td></td>
</tr>
<tr>
<td>from 17:45</td>
<td>Bus transfers for the „HIT“ Guided Tours from the main entrance of the Stadthalle</td>
<td></td>
</tr>
<tr>
<td>from 19:15</td>
<td>GROUP 1</td>
<td></td>
</tr>
<tr>
<td>from 21:00</td>
<td>GROUP 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GROUP 3</td>
<td></td>
</tr>
</tbody>
</table>
### Scientific Session

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>07:00 - 08:00</td>
<td>Knowledge Booster: All you need to know about Particle Therapy - Radiobiology for Physicians and Physicists</td>
</tr>
<tr>
<td>08:00 - 09:30</td>
<td>Integrated Clinical Session: Brain Tumors and Skull Base Tumors</td>
</tr>
<tr>
<td>09:30 - 10:15</td>
<td>Particle Radiation Therapy Beyond Local Control - Margins of Benefit in Pediatric Oncology</td>
</tr>
<tr>
<td>10:15 - 10:45</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>10:45 - 12:00</td>
<td>Free Communication - Clinical</td>
</tr>
<tr>
<td>12:00 - 13:00</td>
<td>Free Communication - New Facilities</td>
</tr>
<tr>
<td>13:00 - 14:00</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>14:00 - 16:00</td>
<td>Treatment Planning Issues / IMPT/ Plan Robustness</td>
</tr>
<tr>
<td>16:00 - 16:30</td>
<td>Closing Remarks and Farewell</td>
</tr>
</tbody>
</table>
Topics: Everything related to Radiation Quality
• Correlated DSB <-> LEM IV
  – Costes et al., DSB clustering and foci kinetics
  – Ballarini et al., DSB pairs and chromosome aberrations
  – Watanabe et al., SSB / DSB distribution within tracks

• Implementations of LEM
  – INFN TPS project (Marchetto, Attili, Russo) -> coop. with IBA
  – Grzanka / Greilich / Jäkel / Waligorski / Olko -> Katz model?

• Criticism of LEM
  – Beuve et al.: -> misinterpretation of term 'local dose'

Summary
World Congress of Medical Physics
Munich, 2009–09–7-12
• Medical physics, biomedical engineering, and bioengineering
• Each 3rd year
• ~ 3000 participants
• 19 parallel sessions
• Proceedings: ~ 9000 pages
• Fairly large industrial exhibition
### Structure of the Congress

<table>
<thead>
<tr>
<th>1st day</th>
<th>2nd day</th>
<th>3rd day</th>
<th>4th day</th>
<th>5th day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oncology</td>
<td>Radiology &amp; Nuclear medicine</td>
<td>Surgery &amp; Intervention</td>
<td>Neurology, Neurosurgery, Rehabilitation</td>
<td>Cardiology, Cardiovascular diseases</td>
</tr>
</tbody>
</table>

1. **Radiation Oncology**
2. **Diagnostic Imaging**
3. **Radiation Protection and Dosimetry, Biological Effects of Radiation**
4. **Image Processing, Biosignal Processing, Modelling and Simulation, Biomechanics**
5. **Information and Communication in Medicine, Telemedicine and e-Health**
6. **Surgery, Minimal Invasive Interventions, Endoscopy and Image Guided Therapy**
7. **Diagnostic and Therapeutic Instrumentation, Clinical Engineering**
8. **Micro- and Nanosystems in Medicine, Active Implants, Biosensors**
9. **Neuroengineering, Neural Systems, Rehabilitation and Prosthetics**
10. **Biomaterials, Cellular and Tissue Engineering, Artificial Organs**
11. **Biomedical Engineering for Audiology, Ophthalmology, Emergency & Dental Medicine**
12. **General Subjects**
13. **Special Topics and Workshops**
Plenary talks (excerpt)

• Willi Kalender (X-computed tomography)
• Thomas Bortfeld (Protonic Prospects)
• Soren Bentzen (Medical Physics meets Molecular Biology)

• Hermann Requardt (Siemens Head of Research)
• Roger Tsien (Nobel Laureate)
• Hans-Jörg Bullinger (Head of Fraunhofer)
GSI contributions

- **Motion management in scanned particle therapy: beam gating & tracking**
  C. Bert, A. Gemmel, N. Saito, N. Chaudhri, R. Lüchtenborg, M. Durante, and E. Rietzel
  IFMBE Proceedings 25/1, p. 345 ff.

- **4D calculation and biological dosimetry of the RBE-weighted dose for scanned carbon ion beam therapy**
  IFMBE Proceedings 25/1, p. 377 ff.

- **Technical accuracy of a beam tracking system for scanned particle therapy of intra-fractionally moving targets**
  N. Saito, C. Bert, N. Chaudhri, A. Gemmel, D. Schardt, G. Kraft, M. Durante, and E. Rietzel
  IFMBE Proceedings 25/1, p. 417 ff.

- **On-line compensation of dose changes introduced by tumor motion during scanned particle therapy**
  R. Lüchtenborg, N. Saito, N. Chaudhri, M. Durante, E. Rietzel, and C. Bert
  IFMBE Proceedings 25/1, p. 449 ff.

- **Fast range compensation inside the beam line for beam tracking in particle therapy**
  N. Chaudhri, N. Saito, C. Bert, P. Steidl, B. Franczak, M. Durante, E. Rietzel, and D. Schardt
  IFMBE Proceedings 25/1, p. 754 ff.

- **Biological Effects of Densely Ionizing Radiation**
  M. Durante

- **Uncertainties of RBE in treatment planning for ion beam tumor therapy: Experimental and modeling aspects**
  T. Friedrich, T. Elsässer, and M. Scholz
  IFMBE Proceedings 25/1, p. 530 ff.
participants: ~ 170 (GSI: 10)

program:
satellite meeting of the KVSF
session 1-7:
symposium: Actual aspects of radiation risk

structure of the program:

poster: 80
oral contributions 15 (GSI: 3)
plenary + invited talks: 19 (GSI: 1)

awards: Christian Streffer / Ulrich-Hagen award
         Julia Haagen (Dresden) / Young scientific award
DNA DSBs → changes in chromatin structure (open up of chromatin) →
recruitment of 53BP1 to DNA DSBs (= sensing ?) → (mechanism ?) → activation of ATM/ ATR
→ activation of p53 → cell cycle arrest


Session 1: **DSB repair** (25 poster)
Changes of chromatin structure and recruitment of repair proteins
Cell cycle dependence of repair pathways

- **Session 2:** **High LET-radiation-Space research** (9 poster)
live cell imaging, microbeam
"contact first hypothesis"
damage processing, chromatin domains and condensation
pan nuclear signal of γH2AX

**Session 3:** **DSB signal transduction** (12 poster)
post-translational modification of repair factors
- intra-S-phase checkpoint
EGFR as a modulator of DNA repair
Back up NHEJ

**Session 4:** **Non-ionizing radiation** (3 poster)
UV induced epigenetic changes (promotor hypermethylation)
Cyclosporine A (immunosuppressant) and p53
Session 5: **Interactions between drugs and ionizing radiation** (3 poster)

alkylating agents

modulation of radiation response in anticancer treatment

**Session 6:** **Clinical applications of radiation biology** (20 poster)

*in vivo* dosimetry using γH2AX foci in PBLs of patients and tumours (hypoxia related)

targeting of DNA damage repair proteins by cis-platin

- accumulation of lactate in tumours and radioresistance/ patient survival (inversely correlated)

expression of EGFR and tumour radiosensitivity

localisation of EGFR and treatment with radioactive antibodies

radiosensibilisation of pancreatic tumour cells by Calveolin (membrane, exo and endocytosis)

- radiosensibilisation of HNSCC by kinase inhibitor (2D versus 3D culture conditions)

- radiation induced externalisation of HSP70 on the plasma membrane of tumour cells

**Session 7:** **Carcinogenesis and genomic instability** (8 poster)

- loss or gain of genes (CGH array) in tumour cells (HMEC, tumour samples), breakpoints and changed gene expression

- targeted over- and/or misexpression screens in somatic tissue using transposons

- allelic imbalances (osteosarcoma, mice) and gene expression (Rb)
Symposium  Actual risk of radiation risk

cardiovascular risk after radiation exposure, anti-inflammatory effect of low doses; proteom changes different for low and high doses

radon risk in houses

childhood leukemia near power plants different for chronic irradiation of persons or in utero
participants: ~ 150

program:
Mechanisms of DNA repair and relevance for radiation oncology
Radiation induced signaling relevant for responses of normal and tumor cells/tissues
Individualization and molecular targeting in radiation oncology
Role of microenvironment for modification of radiation response of normal and tumor cells/tissues

structure of the program:

- poster: 109
- oral contributions: 12
- invited talks: 9
55th Annual Meeting Radiation Research Society
October 4th–7th, 2009 Savannah, GA

- Attendants: about 600
- Parallel sessions
  - Plenary sessions
  - Award sessions
  - Topical reviews
  - Symposia
  - Minisymposia
  - Workshops
  - Posters – great number, much time for viewing
Award lectures

- FAILLA LECTURE Richard Hill
  Evolving Understanding of Tumour and Normal Tissue Radiation Response (microenvironment/tumor progression)
- PRESIDENTIAL SYMPOSIUM (P. Corry)
  Abscopal Effects RT and immunotherapy (Lancet 2009)
- MICHAEL FRY LECTURE Joanne Weidhaas
  Understanding miRNA in response to cytotoxic therapy (C elegans)
- MARIE CURIE LECTURE J. Zhang (Azzam) Role of Translationally Controlled Tumor Protein in adaptive response
Plenary Sessions

• TUMOR METASTASIS
  • Steeg, Patricia S.: Tumor metastasis: mechanistic pathways and roles for radiation research.

• GENOMIC PROFILING AND CLINICAL DECISIONS

• FREE RADICALS IN BIOMEDICAL PROBLEMS:
  • Floyd, Robert: Free radicals in biomedical problems - lessons learned from studying nitrones.

• RADIATION EPIDEMIOLOGY
  • Boice, John D., Jr.: Radiation epidemiology - the past and possible future.
TOPICAL REVIEWS

- Proton and Ion Therapy       G.Taucher-Scholz
- Clustered DNA Damage        Evelyne Sage
- Track Structure in the 21st Century       Michael Dingfelder
- Redox Regulation of the Cell Cycle (SH)        Prabhat Goswami
- ROS and Therapeutic Responses in Cancer       Douglas Spitz
- DNA Repair Pathways and PARP Inhibitors       Anthony Chalmers
- Stem Cells and Genomic Instability       Eric Wright
- Radiation and Medical Physics for Biologists       Jan Burmeister
- Radiation-Induced Cardiomyopathy       Marjan Boerma
- Tumor microenvironment and patient prognosis       Michael Milosevic
- Tumor profiling (hypoxia miRNA) and radiation       Catherine West
- response
SYMPOSIA

- Real-time Biochemistry in the Cell / P. O’Neill and S. Costes
- Asaithamby/Costes/Anderson/Goodarzi
- Radiation Risk Assessment & Epidemiology/ Chairs: Stovall/Metting
- Radiation Cytogenetics: Then and Now/Chairs: Bailey and Bedford
- Bedford/ Maranon/Wilson/ Kato/ Cornforth/ Bailey
- Complex DNA Damage: From Theory to Biological Consequences
  - L. Harrison / Steward / Georgakilas / Greenberg
- Communication Between Tissues and Immune Cells Chairs: Sandra Demaria and Jacky Williams
- Non-targeted Effects: From Animals to the Clinic /T Hei/ Azzam/ Bonner
- Stress Responses in Stem Cells: Limoli / Caiozzo/ Globus/ Georges /Fike
- Radiation response of cancer stem cells: Hill/M. Brown/McBride
MINISYMPOSIA

• High LET and Space Radiation
  P Chang / Girdhani/ Khaled/ Sanchez/ B.Chen/
  Bowman/E Blakely/ Baqai/ Chabriol

• Low Dose Radiation and Risk Assessment
  Boreham / Laiakis

• Bystander and Adaptive Responses /Al Rashid /Mothersill
  Rithidech/ Buonanno/ Yang / Stantz/ Bertucci/Nelson

• Stem Cells Chairs: M Kadhim / S Krueger
  Obenaus/Doerr/Shakhov/ Singh/Zhou/Lange/Chalmers/
  Kunz-Schughart
Poster sessions

- Cell/Tissue Signaling-I / II
- Radiation Countermeasures-I / II / III
- DNA Damage, Repair and Response-I / II
- Experimental Therapeutics-I /II
- High LET/Space (CNS) 38 - streaks, invasion (Hltaky)
- Physico-chemical Events – radiation chemistry
- Epidemiology
- Stem Cells (neural)
- Bystander and Adaptive Responses
- Mutagenesis, Clastogenesis, Carcinogenesis