

Radiological Protection and Nuclear Safety Unit

Dosimetry and Radiobiology

International Journals

E. A. Ainsbury *et al.* Review of retrospective dosimetry techniques for external ionising radiation measurements. *Radiat Prot Dosim.*, 147(4), (2011) 573–592.

D.L. Ramos, J.F. Gaspar, M. Pingarilho, O.M. Gil, A.S. Fernandes, J. Rueff, N.G. Oliveira. Genotoxic effects of doxorubicin in cultured human lymphocytes with different Glutathione S-transferases genotypes. *Mutat Res.*, 724(1-2), (2011) 28-34.

J. G. Alves, P. Ambrosi, D. Bartlett, L. Currivan, JWE van Dijk, E. Fantuzzi, V. Kamenopoulou. The new European Commission technical recommendations for monitoring individuals occupationally exposed to external radiation. *Radiat Prot Dosim.*, 114 (1-4), (2011) 17-25.

M.F. Pereira, J.G. Alves, S. Sarmento, J.A. M. Santos, M.J. Sousa, M. Gouvêa, A.D. Oliveira, J.V. Cardoso, L.M. Santos. Preliminary assessment of the dose to the interventional radiologist in fluoro-CT guided procedures. *Radiat Prot Dosim.*, 114 (1-4), (2011) 488-452.

L.C. Freire, M.F. Pereira, A.M. Calado, L.M. Santos, J.V. Cardoso, J.G. Alves. Evaluation of the performance of two LiF:Mg,Ti and LiF:Mg,Cu,P dosimeters for extremity monitoring. *Radiat. Prot. Dosim.*, 114 (1-4), (2011) 140-143.

M. Neves, F.C. Teixeira, I. Antunes, A. Majkowska, L. Gano, A.C. Santos. Chemical and biological evaluation of ^{153}Sm and $^{46/47}\text{Sc}$ complexes of indazolebisphosphonates for targeted radiotherapy. *Applied Radiation and Isotopes*, 69, (2011) 80-84.

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S. Di Maria, S. Barros, J. Bento, P. Teles, P. Vaz, M. Pereira, C. Figueira, G. Paulo. TLD measurements and Monte Carlo simulations for glandular dose and scatter fraction assessment in mammography: a comparative study. *Radiation Measurements*, 46, (2011) 1103-1108.

D. Tarrío *et al.* Neutron-induced fission cross-section of ^{208}Pb and ^{209}Bi from threshold to 1 GeV: An improved parameterization. *Phys. Rev. C*, 83 (4), (2011) 044620.

G. Tagliente, *et al.* Neutron capture on ^{94}Zr : Resonance parameters and Maxwellian-averaged cross sections. *Phys. Rev. C*, 84, (2011) 015801.

P. Nogueira, M. Zankl, H.Schlattl, P. Vaz. Dose conversion coefficients for monoenergetic electrons

incident on a realistic human eye model with different lens cell populations. *Phys. Med. Biol.*, 56, (2011) 6919-6934.

R. Luis, J. Bermudez, J.C. David, D. Ene, I.F. Goncalves, Y. Kadi, C. Kharoua, F. Negoita, R. Rocca, Y. Romanets, L. Tecchio, P. Vaz. EURISOL Multi-MW Target Unit – MAFF Configuration: Dosimetry and Activation Studies. *Nuclear Technology*, 175 (2), (2011) 445-449.

M.A. Lopez, *et al.* EURADOS coordinated action on Research, quality assurance and training of internal dose assessments. *Rad. Res.*, 144 (1-4) (2011) 349-352.

National Journals

A.D. Oliveira, J. Bento, *BioKinModels. A computational tool to solve and to analyze models of compartments.* Radioproteção, Vol. 2, Nº 18-19, SPPCR, 2011.

International Conference Proceedings

V. Martins, A.C. Antunes, J. Cardoso, L. Santos, O. Monteiro Gil. Influence of age and gender in response to γ -radiation in Portuguese individuals using chromosomal aberration assay – Preliminary findings. Proceedings of EPRBiodose 2010 International Conference. Conference, published in *Radiation Measurements*, 46 (9) (2011) 1000-1003, 10-14 October 2010, Mandelieu La Napoule (Cannes), France.

A. Belchior, O. Gil, P. Almeida, P. Vaz. Evaluation of the cytotoxicity and the genotoxicity induced by α radiation in an A549 cell line. Proceedings of EPRBiodose 2010 International Conference. Conference, published in *Radiation Measurements* 46 (9) (2011) 958-961, 10-14 October 2010, Mandelieu La Napoule (Cannes), France.

A.M. Romero, J. Garcia-Alves, P. Ambrosi, D. Bartlett, L. Currivan, J. van Dijk, E. Fantuzzi, V. Kamenopoulou. Revisión de las nuevas recomendaciones técnicas de la comisión europea para la vigilancia individual de los trabajadores expuestos a radiación externa (ed.2009). 2nd Joint Congress of the Spanish Medical Physics and Radiation Protection Societies, 10-13 May, Sevilla, Spain, (2011).

J. G. Alves, P. Ambrosi, D. Bartlett, L. Currivan, JWE van Dijk, E. Fantuzzi, V. Kamenopoulou. The European technical recommendations for monitoring individuals occupationally exposed to external radiation. 7th International Workshop on Ionizing Radiation Monitoring, 02-07 December, Oarai, Japan (2011).

- R. Sarmiento *et al.* Measurement of the $^{236}\text{U}(n,f)$ cross-section at n_TOF. Proceedings of ND2010 International Conference on Nuclear Data for Science and Technology. Conference published in Journal of the Korean Physical Society, 59 (2) 1793-1796, 26-30 April, Jeju Island, South Korea (2011).
- C. Guerrero *et al.* Study of photon strength function of actinides: the case of ^{235}U , ^{238}Np and ^{241}Pu . Proceedings of ND2010 International Conference on Nuclear Data for Science and Technology. Conference published in Journal of the Korean Physical Society, 59 (2) 1510-1513, 26-30 April, Jeju Island, South Korea (2011).
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- D. Cano-Ott *et al.* Neutron capture measurements on minor actinides at the n TOF facility at CERN: past, present and future. Proceedings of ND2010 International Conference on Nuclear Data for Science and Technology. Conference published in Journal of the Korean Physical Society, 59 (2) 1809-1812, 26-30 April, Jeju Island, South Korea (2011).
- E. Mendoza *et al.* Improved neutron capture cross section measurements with the n-TOF total absorption calorimeter. Proceedings of ND2010 International Conference on Nuclear Data for Science and Technology. Conference published in Journal of the Korean Physical Society, 59 (2) 1813-1816, 26-30 April, Jeju Island, South Korea (2011).
- D. Tarrío *et al.* High-energy neutron-induced fission cross sections of natural lead and bismuth-209. Proceedings of ND2010 International Conference on Nuclear Data for Science and Technology. Conference published in Journal of the Korean Physical Society, 59 (2) 1904-1907, 26-30 April, Jeju Island, South Korea (2011).
- C. Paradela *et al.* $^{237}\text{Np}(n,f)$ cross section: new data and present status. Proceedings of ND2010 International Conference on Nuclear Data for Science and Technology. Conference published in Journal of the Korean Physical Society, 59 (2) 1908-1911, 26-30 April, Jeju Island, South Korea (2011).
- M. Calviani *et al.* Fission cross-section measurements of ^{233}U , ^{245}Cm and $^{241,243}\text{Am}$ at CERN n-TOF facility. Proceedings of ND2010 International Conference on Nuclear Data for Science and Technology. Conference published in Journal of the Korean Physical Society, 59 (2) 1912-1915, 26-30 April, Jeju Island, South Korea (2011).
- G. Giubrone *et al.* The role of Fe and Ni for S-process nucleosynthesis and innovative nuclear technologies. Proceedings of ND2010 International Conference on Nuclear Data for Science and Technology. Conference published in Journal of the Korean Physical Society, 59 (2) 2106-2109, 26-30 April, Jeju Island, South Korea (2011).
- R. Luís *et al.* Optimization studies of the CERN-ISOLDE neutron converter – fission target system. Proceedings of the 4th High Power Targetry Workshop, 2-6 May, Malmö, Sweden (2011).
- S. Di Maria, M. Ottolini, M. Sarotto, F. Martín-Fuertes, M. Vazquez, E.M. Mbala, P. Teles, P. Vaz, D. Castelliti, M. Reale, L. Mansani, P. Baeten. Neutronic assessment and criticality analysis of the in-vessel fuel storage facilities in the Central Design Team (CDT) Project., Proceedings of the 15th International Conference on Emerging Nuclear Energy Systems (ICENES 2011), 15-19 May, San Francisco, USA (2011).

International Communications

Oral

S.Di Maria, M. Ottolini, M. Sarotto, F. Martín-Fuertes, M. Vazquez, E.M. Mbala, P. Teles, P. Vaz, D. Castelliti, M. Reale, L. Mansani, P. Baeten. *Neutronic Assessment and Criticality Analysis of the In-Vessel Fuel Storage Facilities in the Central Design Team (CDT) Project.* 15th International Conference on Emerging Nuclear Energy Systems, 15-19 May 2011, San Francisco, California.

R. Sarmiento *et al.* Measurement of the $^{236}\text{U}(n,f)$ cross-section at n_TOF. ND2010 International Conference on Nuclear Data for Science and Technology. Conference, 26-30 April 2011, Jeju Island, South Korea.

Thesis

MSc.

Ana Teresa Casimiro Nunes, *Dose optimization in CT, in nuclear medicine and in PET-CT procedure.* Masters in Biomedical Engineering, Faculty of Sciences and Technology, University of Coimbra. September 2011. Supervisor: P. Vaz and P. Madeira (Hospital S. José – CHLC).

Mariana da Silva Rufino, *Study of pediatric exposure in computed tomography in Portuguese pediatric hospitals.* Masters in Biomedical Engineering, Faculty of Sciences and Technology, University of Coimbra. September 2011. Supervisor: P. Vaz and P. Madeira (Hospital S. José – CHLC).

Ana Luísa Antunes Neves, *Study of pediatric exposure in CT: assessment of radiosensitivity issues.* Masters in Biomedical Engineering, Faculty of Sciences and Technology, University of Coimbra. September 2011. Supervisor: P. Vaz and P. Madeira (Hospital S. José – CHLC).

Bruno Miguel da Cruz Martins, *Avaliação da dose absorvida na tiróide, em cintigrafias com ^{123}I e $\text{Na}^{99\text{m}}\text{TcO}_4^-$ utilizando modelos biocinéticos e métodos de Monte Carlo*. Masters in Radiações Aplicadas às Tecnologias de Saúde, Escola Superior de Tecnologia de Saúde de Lisboa. December 2011. Supervisor: P. Vaz and F. Alves (Escola Superior de Tecnologia de Saúde de Lisboa).

Luís Miguel Cabeça Marques, *Estudo comparativo de detectores de HPGe, NaI(Tl), CdZnTe para aplicações em segurança e para resposta a ameaças nucleares e*

radiológicas. Masters in Physics Engineering, Faculty of Sciences of the University of Lisbon. December 2011. Supervisor: P. Vaz and J. Marques.

BSc.

Inês Arêde, Joana Vaz, *Caracterização da Sala de Angiografia*. Licenciatura em Radiologia, Universidade Atlântica. July 2011. Supervisors: J.G. Alves, M. Pereira, S. Tecelão (Univ. Atlântica).

Metrology Laboratory of Ionizing radiation

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H. Silva, J. Cardoso, C. Oliveira. Development of a new ionisation chamber for Hp(10) measurement, using Monte-Carlo simulation and experimental methods, *Radiation Protection Dosimetry*, 144 (1-4), (2011) 168-172.

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A.S. Ribeiro, C. Oliveira, M.G. Cox, J. Alves e Sousa, L.L. Martins, J. Cardoso, P. Lime de. *Modelling and uncertainty evaluation for the radiation quality parameters used in Metrological management of diagnostic radiology dosimeters*. Conference on Advanced Mathematical and Computational Tools in Metrology and Testing, 20-22 June 2011, Goteborg, Sweden.

C. Oliveira, J. Cardoso, L. Santos. *Experience of the National Laboratory of Metrology of Ionizing Radiations (LMRI): The TRS N° 398: experimental conditions at LMRI. Traceability and intercomparison results.* Workshop- IAEA supported national TPS audit", 24 September 2011, Coimbra, Portugal.

V. Sochor *et al.* *Comparison of measurements and Monte Carlo simulations of 3D distributions of dose-to-water by brachytherapy sources*. Conference on Advanced Metrology for Cancer Therapy, 29 Nov.–1 Dec. 2011, Braunschweig, Germany.

J. Plagnard, C. Oliveira, D. Cutarella, J. Gouriou, M. Rodrigues, L. Portugal, J. Cardoso, I. Aubineau-Lanièce. *Full characterisation of the ^{125}I IBt bebig I25.S16 brachytherapy source and sensitivity study of the absorbed dose to water due to the seed dimensional variations*. Conference on Advanced Metrology for Cancer Therapy, Nov 29th - Dec 1st, 2011, Braunschweig, Germany.

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C. Oliveira, J. Cardoso, L. Santos, P. Lime de, D. Góis, M. Oliveira. *A dosimetria no radiodiagnóstico*. 4º Encontro Nacional da Sociedade Portuguesa de Metrologia. 11 Nov., Lisboa, Portugal.

C. Oliveira. *Técnicas não invasivas*. Colóquio “A Metrologia na Saúde”. Instituto Português da Qualidade. 13 December 2011, Lisboa, Portugal.

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Décia Clotilde Perestrelo Góis, *Caracterização das qualidades de radiação de uma ampola de raios X com ânodo de tungsténio no âmbito da mamografia*. Faculdade Ciências e Tecnologia da Universidade Nova de Lisboa. Lisboa 2011. Supervisor: C. Oliveira and J. Cardoso.

Ana Isabel Água-Morna Braga de Carvalho, *Projecto, construção e caracterização de um irradiador portátil com fonte de Cs-137 para verificação metrológica de monitores fixos de área*. Faculdade Ciências e Tecnologia da Universidade Nova de Lisboa. Lisboa 2011. Supervisor: C. Oliveira and J. Cardoso.

Mário Fartaria de Oliveira, *Estudos dosimétricos em radiodiagnóstico*. Faculdade Ciências e Tecnologia da Universidade Nova de Lisboa. Lisboa 2011. Supervisor: C. Oliveira and J. Cardoso.

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Vanessa Pereira, *Estudo do calibrador de doses modelo PTW Curiementor 3*. ESTeSL. Lisboa. 2011. Supervisor: C. Oliveira and J. Cardoso.

Diana D. Duarte, *Trabalhos experimentais realizados em medicina nuclear e protecção radiológica no âmbito da metrologia das radiações ionizantes*. ESTeSL. Lisboa. 2011. Supervisor: J. Cardoso.

Environmental Radioactivity

International Journals

F.P. Carvalho, J.M. Oliveira, A.M. Soares. Sediment accumulation and bioturbation rates in the deep Northeast Atlantic determined by radiometric techniques. *ICES Journal Marine Science*, 68(3), (2011) 427-435.

F.P. Carvalho, J.M. Oliveira, G. Alberto. Factors affecting ^{210}Po and ^{210}Pb activity concentrations in mussels and implications for environmental bio-monitoring programmes. *Journal of Environmental Radioactivity*, 102, (2011) 128-137.

F.P. Carvalho, J.M. Oliveira, M. Malta. Radionuclides in plants growing on sludge and water from uranium mine water treatment. *Ecological Engineering*, 37, (2011) 1058-1063.

J. Lourenço, A. Silva, F. Carvalho, J. Oliveira, M. Malta, S. Mendo, F. Gonçalves, R. Pereira. Histopathological changes in the earthworm *Eisenia andrei* associated with the exposure to metals and radionuclides. *Chemosphere* 85, (2011) 1630-1634.

J.I. Lourenço, R.O. Pereira, A.C. Silva, J.M. Morgado, F.P. Carvalho, J.M. Oliveira, M.P. Malta, A.A. Paiva, S.A. Mendo, F.J. Gonçalves. Genotoxic endpoints in the earthworms sub-lethal assay to evaluate natural soils contaminated by metals and radionuclides. *Journal of Hazardous Materials* 186, (2011) 788-795.

O. Masson, *et al.* Tracking of airborne radionuclides from the damaged Fukushima Dai-Ichi nuclear reactors by European networks. *Environmental Science and Technology* 45 (18), (2011) 7670-7677.

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F.P. Carvalho. Segurança na aviação: os scanners de corpo inteiro para controlo de passageiros. *Revista SEGURANÇA* 200 (Janeiro/Fevereiro) (2011) 10-13.

M.J. Madruga, M. Reis. Natural radioactivity in building materials: the European legislation and its implementation in Portugal. *Radioproteção*, Vol. II (nº18-19), ISBN -0874-7016, (2011) 42-46.

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F.P. Carvalho, J.M. Oliveira, M. Malta, (2011). Vegetation fires and release of radioactivity into the air. In: "Environ. Health and Biomedicine", WIT Transactions on Biomedicine and Health Vol.15. WIT Press, UK, p 3-9.

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F.P. Carvalho, J.M. Oliveira, W.E. Falck (2011). Geochemistry of radionuclides in groundwaters at the former uranium and radium mining region of Sabugal, Portugal. In: "The New Uranium Mining Boom. Challenge and lessons learned". B. Merkel and M. Schipek (Edts), pp. 81-90. Springer-Verlag Berlin.

F.P. Carvalho, J.M. Oliveira, M. Malta. Radionuclides in deep-sea fish and other organisms from the North Atlantic Ocean. Proceedings of an ICES-sponsored symposium. Published in *ICES Journal Marine Science*, 68 (2) (2011) 333-340, 27-30 April 2009, Faial, Azores, Portugal.

F.P. Carvalho. Polonium (^{210}Po) and lead (^{210}Pb) in marine organisms and their transfer in marine food chains. Proceedings of International Topical Meeting on Polonium and Radioactive Lead Isotopes. Published in *Journal of Environmental Radioactivity*, 102 (2011) 462-472, 26-28 October 2009, Seville, Spain.

M. Malta, F.P. Carvalho. Radionuclides in marine mammals of the Portuguese coast. Proceedings of International Topical Meeting on Polonium and Radioactive Lead Isotopes. Published in *Journal of Environmental Radioactivity* 102 (2011) 473-478, 26-28 October 2009, Seville, Spain.

A.R. Gomes, J. Abrantes, A. Libânio, M.J. Madruga, M. Reis (2011). Improvement of the quality assurance in tritium analyses in waters by LSC. In: LSC 2010, Advances in Liquid Scintillation Spectrometry. Radiocarbon, Editor: P. Cassette, ISBN: 978-0-9638314-7-7, University of Arizona, Tucson, Arizona, USA, p. 211-218.

I. Lopes, J. Abrantes, J. Melo, M.J. Madruga, M. Reis (2011). LSC- Quality assurance on gross alpha/beta measurements in waters. In: LSC 2010, Advances in Liquid Scintillation Spectrometry. Radiocarbon, Editor: P. Cassette, ISBN: 978-0-9638314-7-7, University of Arizona, Tucson, Arizona, USA, p. 203-209.

J. Melo, I. Lopes, J. Abrantes, M.J. Madruga, M. Reis (2011). Comparative study of gross alpha and beta measurements in drinking waters. In: LSC 2010, Advances in Liquid Scintillation Spectrometry. Radiocarbon, Editor: P. Cassette, ISBN: 978-0-9638314-7-7, University of Arizona, Tucson, Arizona, USA, p. 99-105.

International Communications

Oral

F.P. Carvalho. *Uranium series radionuclides in the water column of the Northeast Atlantic Ocean*. IAEA International Symposium on Isotopes in Hydrology, Marine Ecosystems, and Climate Change Studies, Oceanographic Museum 27 March-1 April 2011. Book of Abstracts (Keynote lecture). Monaco.

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F.P. Carvalho, J.M. Oliveira, A.M. Soares. *210Pb-excess and sediment accumulation rates at the Iberian continental margin*. IAEA International Symposium on Isotopes in Hydrology, Marine Ecosystems, and Climate Change Studies, Oceanographic Museum 27 March–1 April 2011. Book of Abstracts. Monaco.

Poster

F.P. Carvalho, J.M. Oliveira, M. Malta. *Radiation exposure through smoke inhalation from biomass burning*. International Conference on Radioecology & Environmental Radioactivity, Environment and Nuclear Renaissance. Book of Abstracts. 19-24 June 2011, Hamilton, Ontario, Canada.

F.P. Carvalho, J.M. Oliveira, M. Malta. *Cycling of uranium series radionuclides in a freshwater pond*. International Conference on Radioecology & Environmental Radioactivity, Environment and Nuclear Renaissance. Book of Abstracts. 19-24 June 2011, Hamilton, Ontario, Canada.

F.P. Carvalho, J.M. Oliveira. *Bioassay of uranium isotopes in human urine by alpha spectrometry*. International Conference on Radioecology & Environmental Radioactivity, Environment and Nuclear Renaissance. Book of Abstracts. 19-24 June 2011, Hamilton, Ontario, Canada.

F.P. Carvalho, J.M. Oliveira, M. Malta. *Radioactivity in surface waters near the old uranium mines of Quarta-Feira Valley, Portugal*. International Conference on Radioecology & Environmental Radioactivity, Environment and Nuclear Renaissance.

Book of Abstracts. 19-24 June 2011, Hamilton, Ontario, Canada.

J. Lourenço, R. Pereira, J. Morgado, F.P. Carvalho, J.M. Oliveira, M.P. Malta, A. Paiva, F. Gonçalves, S. Mendo. *In situ and laboratorial assays with earthworms for the risk assessment of sites contaminated with radioactive wastes*. International Conference on Radioecology & Environmental radioactivity Environment and Nuclear Renaissance. Book of Abstracts. 19-24 June 2011, Hamilton, Ontario, Canada.

S.M. Marques, R. Pereira, F.P. Carvalho, J.M. Oliveira, M.P. Malta, F. Gonçalves. *In situ short-term growth effects in *Pelophylax perezi* tadpoles exposed in uranium mine ponds*. International Conference on Radioecology & Environmental radioactivity Environment and Nuclear Renaissance. Book of Abstracts. 19-24 June 2011, Hamilton, Ontario, Canada.

Internal Reports

M.J. Madruga, F.P. Carvalho, M. Reis, J. Alves, J.A. Corisco, R. Trindade, I. Lopes, J. Abrantes, J.M. Oliveira, L. Silva, L. Portugal, M. Malta, A. Libânio, A. Mourato, G. Silva, L. Santos, A. Baptista, A.R. Gomes, E. Andrade, G. Carvalhal, J. Melo, M. Pereira. *Programas de Monitorização Radiológica Ambiental (Ano 2010)*. Internal Report UPSR, Série A, nº38/11, ISBN 978-989-96542-6-6, Depósito Legal 194022/03, pp. 135.

Radioprotection and Radioactive Waste

International Journals

P. Duarte, A. Mateus, I. Paiva, R. Trindade, P. Santos: *Usefulness of systematic in situ gamma-ray surveys in the radiometric characterization of natural systems with poorly-contrasting geological features (examples from NE of Portugal)*. *J. Applied Radiation and Isotopes* 69, (2011) 463-474.

National Communications

Oral

C. Oliveira, L. Portugal, I. Paiva, M. Reis, R. Trindade. *A Metrologia das Radiações Ionizantes na Indústria Metalúrgica*, ITN/EURAMET, 4º Encontro Nacional da SPMet, Metrologia – Suporte da Competitividade na Indústria, ISQ, Tagus Park, Oeiras, Nov.11th, 2011