

## Curriculum Vitae

Oksana G. Polischuk

### Current position

Junior scientific researcher  
Lepton Physics Department  
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### Personal data

Born in Vasylkiv, Kyiv region, Ukraine on June 1, 1985 (family name before marriage: Shkulkova).

Married.

### Education:

2002-2007: Student of Physics Department of the National Taras Shevchenko University of Kyiv, Ukraine.  
2006: Bachelor Diploma in Physics from the National Taras Shevchenko University of Kyiv, Ukraine. Title of diploma work: "Study of penetration effects in E1 and M1 transitions of  $^{44}\text{Sc}$ ".  
2007: Master Diploma in Physics from the National Taras Shevchenko University of Kyiv, Ukraine. Title of diploma work: "Isotopic ratio for the  $^{198\text{m}}\text{Au}$  in reaction  $^{197}\text{Au}(\text{d},\text{p})^{198\text{m}}\text{Au}$ ".  
2007-2011: PhD student, Institute for Nuclear Research, Kyiv, Ukraine.  
2012: Ph.D (nuclear, particle and high energy physics). Advisor: Dr. V.I. Tretyak (Thesis title: "Search for double beta decay of  $^{100}\text{Mo}$ ,  $^{96}\text{Ru}$  and  $^{104}\text{Ru}$ ")

### Language skills:

Ukrainian (native), Russian, English.

### Scientific interests:

Search for double beta decay and dark matter, solar axions; investigation of rare alpha and single beta decays, low background HP Ge  $\gamma$  spectrometry. R&D of crystal scintillators for dark matter experiments, including low temperature studies. Development of low background crystal scintillators, including crystals from enriched materials. Pulse-shape discrimination with scintillation detectors.

### Professional Employment:

2005 - 2007: Engineer, Nuclear Physics Department, Kyiv National University, Kyiv, Ukraine  
2007 - 2010: Engineer, Lepton Physics Department, Institute for Nuclear Research, Kyiv, Ukraine  
2009 - 2012: Leading engineer, Lepton Physics Department, Institute for Nuclear Research, Kyiv, Ukraine  
2012 – up to now: Junior scientific researcher, Lepton Physics Department, Institute for Nuclear Research, Kyiv, Ukraine

## Grants and Scholarships

- 2007 – 2008: Grant of National Academy of Sciences of Ukraine for young scientists “Research of  $2\beta$ -decay of  $^{116}\text{Cd}$  in Solotvina Underground Laboratory of Institute of nuclear research of National Academy of Sciences of Ukraine”
- 2007 – 2009: The Royal Society Grant of Great Britain “Development of advanced scintillation detectors for cryogenic dark matter search”
- 2009 – 2010: Grant of National Academy of Sciences of Ukraine for young scientists “Double beta decay and neutrino properties”

## Awards

2010 – Prize of the President of Ukraine for young scientists for the cycle of works "Rare nuclear processes" (together with other 3 persons)

## Main achievements

- 1) Experimental observation of two neutrino double beta decay of  $^{100}\text{Mo}$  to the first excited  $0^+_1$  level of  $^{100}\text{Ru}$  with the highest to-date accuracy;
- 2) New limits on half-life for double beta processes in  $^{96}\text{Ru}$ ,  $^{104}\text{Ru}$  and  $^{190}\text{Pt}$  isotopes;
- 3) New limit on the mass of  $^7\text{Li}$  solar axions (the best to-date for  $^7\text{Li}$ );
- 4) First observation of alpha decay of  $^{190}\text{Pt}$  to the first excited level of  $^{186}\text{Os}$ ;
- 5) Development of enriched  $^{106}\text{CdWO}_4$  crystal scintillators to search for double beta decay processes in  $^{106}\text{Cd}$ ;
- 6) Development and study of inorganic crystal scintillators ( $\text{CaMoO}_4$ ,  $\text{ZnWO}_4$ ,  $\text{MgWO}_4$ ,  $\text{PbWO}_4$ ,  $\text{PbMoO}_4$ ,  $\text{ZnMoO}_4$ ) as detectors to search for double beta decay and dark matter.

## Reports at conferences

- Annual Conference of Institute for Nuclear Research, Kyiv, Ukraine — *January 2008, 2009, 2010, 2011.*
- School-workshop of young scientists “Scintillation Processes and Materials for Registration of Ionization Radiation”, Kharkiv, Ukraine — *September, 2011.*
- The 2<sup>nd</sup> International Conference “Current Problems in Nuclear Physics and Atomic Energy”, Kyiv, Ukraine — *June 09–15, 2008.*
- The 3<sup>rd</sup> International Conference “Current Problems in Nuclear Physics and Atomic Energy”, Kyiv, Ukraine — *June 07–12, 2010.*
- International Conference “Engineering of Scintillation Materials and Radiation Technologies”, Kharkiv, Ukraine — *November 16–21, 2008.*

## Main scientific publications:

1. S.S. Drapay, V.A. Zheltonozhsky, L.V. Sadovnikov, O.G. Shkulkova, N.V. Strilchuk. **Study of penetration effects in E1 and M1 transitions of  $^{44}\text{Sc}$ .** *Voprosy Atomnoy Nauky i Tehniky* 2 (2006) 45-47 (in Russian).
2. S.S. Drapey, V.A. Zheltonozhsky, L.V. Sadovnikov, N.V. Strilchuk, O.G. Shkulkova. **Study of penetration effects in the E1 and M1 transitions in  $^{44}\text{Sc}$ .** *Bull. Rus. Acad. Sci. Phys.* 71 (2007) 887-889.
3. A.N. Annenkov, O.A. Buzanov, F.A. Danevich et al. **Development of  $\text{CaMoO}_4$  crystal scintillators for double beta decay experiment with  $^{100}\text{Mo}$ .** *Nucl. Instrum. Meth. A* 584 (2008) 334–345.
4. F.A. Danevich, S. Henry, H. Kraus, R. McGowan, V.B. Mikhailik, O.G. Shkulkova, J. Telfer. **Scintillation properties of pure and Ca-doped  $\text{ZnWO}_4$  crystals.** *Phys. Stat. Sol. (a)* 205 (2008) 335–339.
5. P. Belli, R. Bernabei, R. Cerulli, F.A. Danevich, A. d’Angelo, V.I. Goriletsky, B.V. Grinyov, A. Incicchitti, V.V. Kobychyev, M. Laubenstein, V.M. Mokina, S.S. Nagorny, S. Nisi,

- D. Prosperi, O.G. Shkulkova, V.I. Tretyak.  **${}^7\text{Li}$  solar axions: Preliminary results and feasibility studies.** Nucl. Phys. A 806 (2008) 388–397.
6. H. Kraus, F.A. Danevich, S. Henry, V.V. Kobychhev, V.B. Mikhailik, V.M. Mokina, S.S. Nagorny, O.G. Polischuk, V.I. Tretyak.  **$\text{ZnWO}_4$  scintillators for cryogenic dark matter experiments.** Nucl. Instrum. Meth. A 600 (2009) 594-598.
  7. P. Belli, R. Bernabei, F. Cappella, R. Cerulli, F.A. Danevich, S. d'Angelo, A. Incicchitti, M. Laubenstein, O.G. Polischuk, D. Prosperi, V.I. Tretyak. **Search for double- $\beta$  decays of  ${}^{96}\text{Ru}$  and  ${}^{104}\text{Ru}$  by ultra-low background HPGe  $\gamma$  spectrometry.** Eur. Phys. J. A 42 (2009) 171-177.
  8. F.A. Danevich, D.M. Chernyak, A.M. Dubovik, B.V. Grinyov, S. Henry, H. Kraus, V.M. Kudovbenko, V.B. Mikhailik, L.L. Nagornaya, R.B. Podvianuk, O.G. Polischuk, I.A. Tupitsyna, Yu.Ya. Vostretsov.  **$\text{MgWO}_4$  – A new crystal scintillator,** Nucl. Instrum. Meth. A 608 (2009) 107-115.
  9. L.L. Nagornaya, B.V. Grinyov, A.M. Dubovik, Yu.Ya. Vostretsov, I.A. Tupitsyna, F.A. Danevich, V.M. Mokina, S.S. Nagorny, O.G. Shkulkova, H. Kraus, V.B. Mikhailik. **Large volume  $\text{ZnWO}_4$  crystal scintillators with excellent energy resolution and low background.** IEEE Trans. Nucl. Sci. 56 (2009) 994-997.
  10. L.L. Nagornaya, F.A. Danevich, A.M. Dubovik, B.V. Grinyov, S. Henry, V. Kapustyanyk, H. Kraus, D.V. Poda, V.M. Kudovbenko, V.B. Mikhailik, M. Panasyuk, O.G. Polischuk, V. Rudyk, V. Tsybul'skyi, I.A. Tupitsyna, Yu.Ya. Vostretsov. **Tungstate and molybdate scintillators to search for dark matter and double beta decay.** IEEE Trans. Nucl. Sci. 56 (2009) 2513-2518.
  11. P. Belli, R. Bernabei, R.S. Boiko, V.B. Brudanin, N. Bukilic, R. Cerulli, D.M. Chernyak, F.A. Danevich, S. d'Angelo, V.Ya. Degoda, A.E. Dossovitskiy, E.N. Galashov, Yu.A. Hyzhnyi, S.V. Ildyakov, A. Incicchitti, V.V. Kobychhev, O.S. Kolesnyk, G.P. Kovtun, V.M. Kudovbenko, J.R. de Laeter, A.L. Mikhlin, S.S. Nagorny, S.G. Nedilko, A.S. Nikolaiko, S. Nisi, D.V. Poda, R.B. Podvianuk, O.G. Polischuk, D. Prosperi, A.P. Shcherban, V.P. Shcherbatskyi, V.N. Shlegel, D.A. Solopikhin, Yu.G. Stenin, V.I. Tretyak, Ya.V. Vasiliev, V.D. Virich. **Development of enriched  ${}^{106}\text{CdWO}_4$  crystal scintillators to search for double  $\beta$  decay processes in  ${}^{106}\text{Cd}$ .** Nucl. Instrum. Meth. A 615 (2010) 301-306.
  12. P. Belli, R. Bernabei, R.S. Boiko, F. Cappella, R. Cerulli, F.A. Danevich, S. d'Angelo, A. Incicchitti, V.V. Kobychhev, B.N. Kropivyansky, M. Laubenstein, P.G. Nagorny, S.S. Nagorny, S. Nisi, F. Nozzoli, D.V. Poda, D. Prosperi, O.G. Polischuk, V.I. Tretyak, I.M. Vyshnevskyi, S.S. Yurchenko. **New observation of  $2\beta 2\nu$  decay of  ${}^{100}\text{Mo}$  to the  $0^+_1$  level of  ${}^{100}\text{Ru}$  in the ARMONIA experiment.** Nucl. Phys. A 846 (2010) 143-156.
  13. F.A. Danevich, B.V. Grinyov, S. Henry, M.B. Kosmyna, H. Kraus, N. Krutyak, V.M. Kudovbenko, V.B. Mikhailik, L.L. Nagornaya, B.P. Nazarenko, A.S. Nikolaiko, O.G. Polischuk, V.M. Puzikov, A.N. Shekhovtsov, V.I. Tretyak, Yu.Ya. Vostretsov. **Feasibility study of  $\text{PbWO}_4$  and  $\text{PbMoO}_4$  crystal scintillators for cryogenic rare events experiments.** Nucl. Instrum. Meth. A 622 (2010) 608-613.
  14. P. Belli, R. Bernabei, F. Cappella, R. Cerulli, F.A. Danevich, S. d'Angelo, A. Incicchitti, M. Laubenstein, O.G. Polischuk, D. Prosperi, V.I. Tretyak. **Search for double  $\beta$  decays of  ${}^{96}\text{Ru}$  and  ${}^{104}\text{Ru}$  with high purity Ge  $\gamma$  spectrometry.** Nucl. Phys. At. Energy 11 (2010) 362-366.
  15. P. Belli, R. Bernabei, R.S. Boiko, V.B. Brudanin, F. Cappella, V. Caracciolo, R. Cerulli, D.M. Chernyak, F.A. Danevich, S. d'Angelo, A.E. Dossovitskiy, E.N. Galashov, A. Incicchitti, V.V. Kobychhev, S.S. Nagorny, F. Nozzoli, B.N. Kropivyansky, V.M. Kudovbenko, A.L. Mikhlin, A.S. Nikolaiko, D.V. Poda, R.B. Podvianuk, O.G. Polischuk, D. Prosperi, V.N. Shlegel, Yu.G. Stenin, J. Suhonen, V.I. Tretyak, Ya.V. Vasiliev. **First results of the experiment to search for  $2\beta$  decay of  ${}^{106}\text{Cd}$  with the help of  ${}^{106}\text{CdWO}_4$  crystal scintillators.** Nucl. Phys. At. Energy 12 (2011) 124-128.

16. P. Belli, R. Bernabei, F. Cappella, R. Cerulli, F.A. Danevich, A.M. Dubovik, S. d'Angelo, E.N. Galashov, B.V. Grinyov, A. Incicchitti, V.V. Kobychyev, M. Laubenstein, L.L. Nagornaya, F. Nozzoli, D.V. Poda, R.B. Podviyanuk, O.G. Polischuk, D. Prosperi, V.N. Shlegel, V.I. Tretyak, I.A. Tupitsyna, Ya.V. Vasiliev, Yu.Ya. Vostretsov. **Radioactive contamination of ZnWO<sub>4</sub> crystal scintillators**. Nucl. Instrum. Meth. A 626&627 (2011) 31-38.
17. P. Belli, R. Bernabei, F. Cappella, R. Cerulli, F.A. Danevich, A. Incicchitti, M. Laubenstein, S.S. Nagorny, S. Nisi, O.G. Polischuk, V.I. Tretyak. **First observation of  $\alpha$  decay of <sup>190</sup>Pt to the first excited level ( $E_{exc} = 137.2$  keV) of <sup>186</sup>Os**. Phys. Rev. C 83 (2011) 034603, 7 p.
18. P. Belli, R. Bernabei, F. Cappella, R. Cerulli, F.A. Danevich, A. Di Marco, A. Incicchitti, M. Laubenstein, S.S. Nagorny, S. Nisi, O.G. Polischuk, V.I. Tretyak. **First search for double  $\beta$  decay of platinum by ultra-low background HP Ge  $\gamma$  spectrometry**. Eur. Phys. J. A 47 (2011) 91, 8 p.
19. A.S. Barabash, P. Belli, R. Bernabei, R.S. Boiko, F. Cappella, V. Caracciolo, D.M. Chernyak, R. Cerulli, F.A. Danevich, M.L. Di Vacri, A.E. Dossovitskiy, E.N. Galashov, A. Incicchitti, V.V. Kobychyev, S.I. Konovalov, G.P. Kovtun, V.M. Kudovbenko, M. Laubenstein, A.L. Mikhlin, S. Nisi, D.V. Poda, R.B. Podviyanuk, O.G. Polischuk, A.P. Shcherban, V.N. Shlegel, D.A. Solopikhin, Yu.G. Stenin, V.I. Tretyak, V.I. Umatov, Ya.V. Vasiliev, V.D. Virich. **Low background detector with enriched <sup>116</sup>CdWO<sub>4</sub> crystal scintillators to search for double  $\beta$  decay of <sup>116</sup>Cd**. JINST 06 (2011) P08011, 24 p.
20. P. Belli, R. Bernabei, F. Cappella, R. Cerulli, F.A. Danevich, A. Di Marco, A. Incicchitti, M. Laubenstein, S.S. Nagorny, S. Nisi, O.G. Polischuk, V.I. Tretyak. **First search for double  $\beta$  decay of platinum by ultra-low background HP Ge  $\gamma$  spectrometry**. Eur. Phys. J. A 47(2011)91, 8 p.
21. P. Belli, R. Bernabei, F. Cappella, R. Cerulli, F.A. Danevich, A.M. Dubovik, S. d'Angelo, E.N. Galashov, B.V. Grinyov, A. Incicchitti, V.V. Kobychyev, M. Laubenstein, L.L. Nagornaya, F. Nozzoli, D.V. Poda, R.B. Podviyanuk, O.G. Polischuk, D. Prosperi, V.N. Shlegel, V.I. Tretyak, I.A. Tupitsyna, Ya.V. Vasiliev, Yu.Ya. Vostretsov. **Radioactive contamination of ZnWO<sub>4</sub> crystal scintillators**. Nucl. Instrum. Meth. A 626&627(2011)31-38.
22. P. Belli, R. Bernabei, F. Cappella, R. Cerulli, F.A. Danevich, A. d'Angelo, A. Incicchitti, V.V. Kobychyev, M. Laubenstein, O.G. Polischuk, V.I. Tretyak. **Search for <sup>7</sup>Li solar axions using resonant absorption in LiF crystal: Final results**. Phys. Lett. B 711(2012)41-45.
23. P. Belli, R. Bernabei, R.S. Boiko, V.B. Brudanin, F. Cappella, V. Caracciolo, R. Cerulli, D.M. Chernyak, F.A. Danevich, S. d'Angelo, E.N. Galashov, A. Incicchitti, V.V. Kobychyev, M. Laubenstein, V.M. Mokina, D.V. Poda, R.B. Podviyanuk, O.G. Polischuk, V.N. Shlegel, Yu.G. Stenin, J. Suhonen, V.I. Tretyak, Ya.V. Vasiliev. **Search for double- $\beta$  decay processes in <sup>106</sup>Cd with the help of a <sup>106</sup>CdWO<sub>4</sub> crystal scintillator**. Phys. Rev. C 85(2012)044610, 12 p.