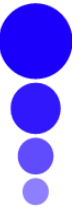




CZECH TECHNICAL  
UNIVERSITY  
IN PRAGUE

CENTRE FOR  
**MEDICAL  
RADIATION PHYSICS**



**UNIVERSITY OF  
WOLLONGONG**



# ARDENT MEETING

June 13<sup>th</sup> 2013  
Kevin Loo ESR 8

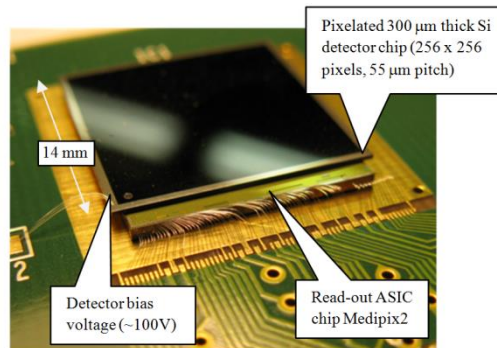
# Reminder of who I am

- Born in Bathurst, NSW, Australia
- Raised in Wollongong, NSW, Australia
- Studied B. Medical Radiation Physics





- PhD studies commenced in 2010
- Use of Timepix detectors for a novel in-body imaging device in prostate brachytherapy



# BrachyView: Thesis writing

- Aim for thesis submission by August 2013



## **BrachyView: Proof-of-principle of a novel in-body gamma camera for low dose-rate prostate brachytherapy**

M. Petasecca,<sup>a)</sup> K. J. Loo, M. Safavi-Naeini, Z. Han, and P. E. Metcalfe  
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*Brain and Mind Research Institute, University of Sydney, NSW 2006, Australia and Centre for Medical Radiation Physics, University of Wollongong, Wollongong, NSW 2522, Australia*

S. Pospisil and J. Jakubek  
*Institute of Experimental and Applied Physics, Czech Technical University of Prague, Prague, Czech Republic*

J. A. Bucci  
*St George Cancer Care Centre, St George Hospital, Kogarah, NSW 2217, Australia*

M. Zaider  
*Department of Medical Physics, Memorial Sloan-Kettering Cancer Center, New York, New York 10021*

M. L. F. Lerch, Y. Qi, and A. B. Rosenfeld  
*Centre for Medical Radiation Physics, University of Wollongong, Wollongong, NSW 2522, Australia*

(Received 12 August 2012; revised 20 February 2013; accepted for publication 21 February 2013; published 15 March 2013)

# BrachyView: Progress



Memorial Sloan-Kettering  
Cancer Center

*The Best Cancer Care. Anywhere.*

Dear Dr. Zaider,

I wanted to let you know that your recent article, *BrachyView: Proof-of-principle of a novel in-body gamma camera for low dose-rate prostate brachytherapy*, is featured in *Today's Science Sparks* on the Library website at <https://library.mskcc.org> for May 22nd. In the future, the image selected from this article will also be featured on our plasma screens at the [CyberLibrary Cafe](#) in the Zuckerman Research Center.

If you are reading this email after the specified date, please see the *Today's Science Sparks* archive at <https://library.mskcc.org/sparks/month/2013/05>

Feel free to share this information with your co-authors!

2013-05-21

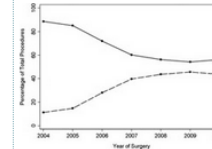


Fig 2. Percentage of endoscopic BPH procedures performed as electrosurgical TURP (CPT 52601, 52612 or 52614) (solid curve) and LP (CPT 52648 or CPT 52649) (dashed line) by year of urologist (re)certification.

- [Contemporary practice patterns of endoscopic surgical management for benign prostatic hyperplasia among urologists in the United States](#)
- Lowrance WT, Southwick A, Maschino AC, Sandhu JS
- J Urol. 2013 May;189(5):1811-6.

2013-05-22

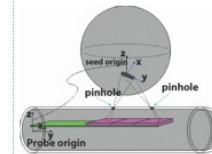


Fig 1. Schematic of BrachyView rectal probe. Three side-by-side Medipix detectors are placed inside of the TRUS probe and inferiorly to the prostate gland.

- [BrachyView: Proof-of-principle of a novel in-body gamma camera for low dose-rate prostate brachytherapy](#)
- Petasecca M, Loo KJ, Safavi-Naeini M, Han Z, Metcalfe PE, Meikle S, Pospisil S, Jakubek J, Bucci JA, Zaider M, Lerch ML, Qi Y, Rosenfeld AB
- Med Phys. 2013 Apr;40(4):041709.

2013-05-23

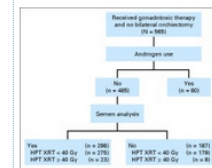
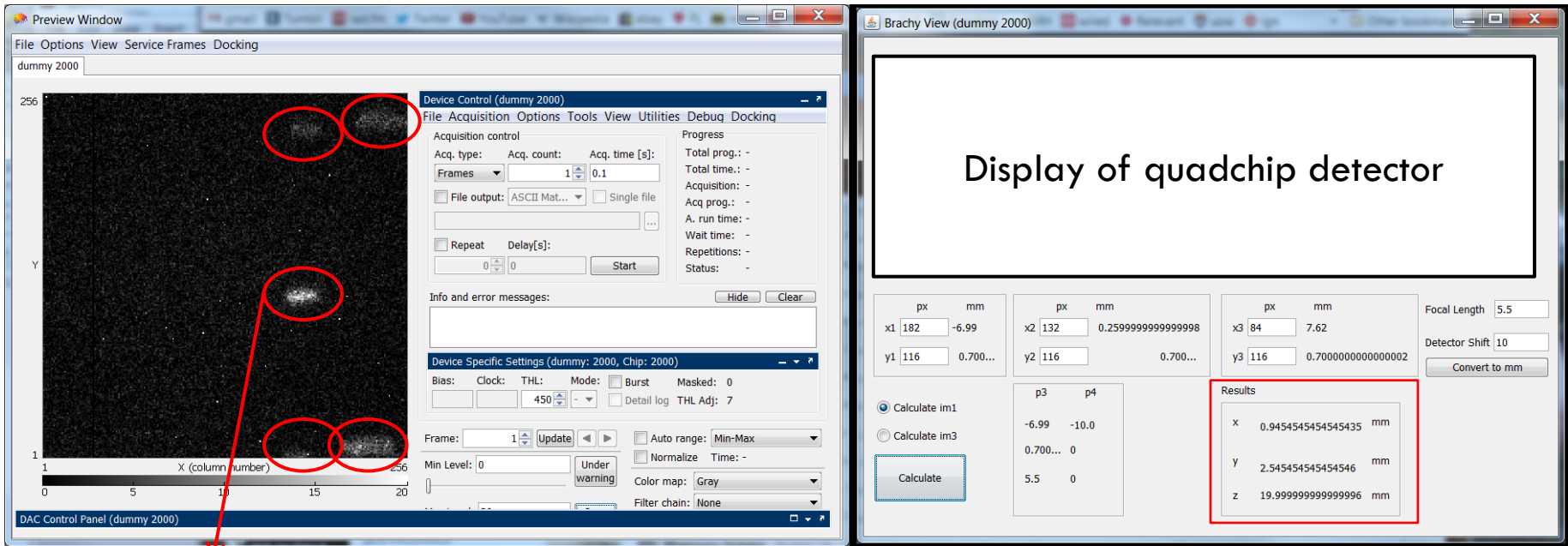


Fig 1. CONSORT diagram showing patient population from which semen analysis data were derived. HPT XRT, hypothalamic-pituitary

- [Lack of specificity of plasma concentrations of inhibin B and follicle-stimulating hormones for identification of azoospermic survivors of childhood cancer: a report from the st jude lifetime cohort study](#)
- Green DM, Zhu L, Zhang N, Sklar CA, Ke RW, Kuttreh WH, Klosky JL, Spunt SL, Metzger ML, Navid F, Srivastava D, Robison LL, Hudson MM
- J Clin Oncol. 2013 Apr 1;31(10):1324-8.

# BrachyView: Progress

- Plug-in integration into Pixelman software

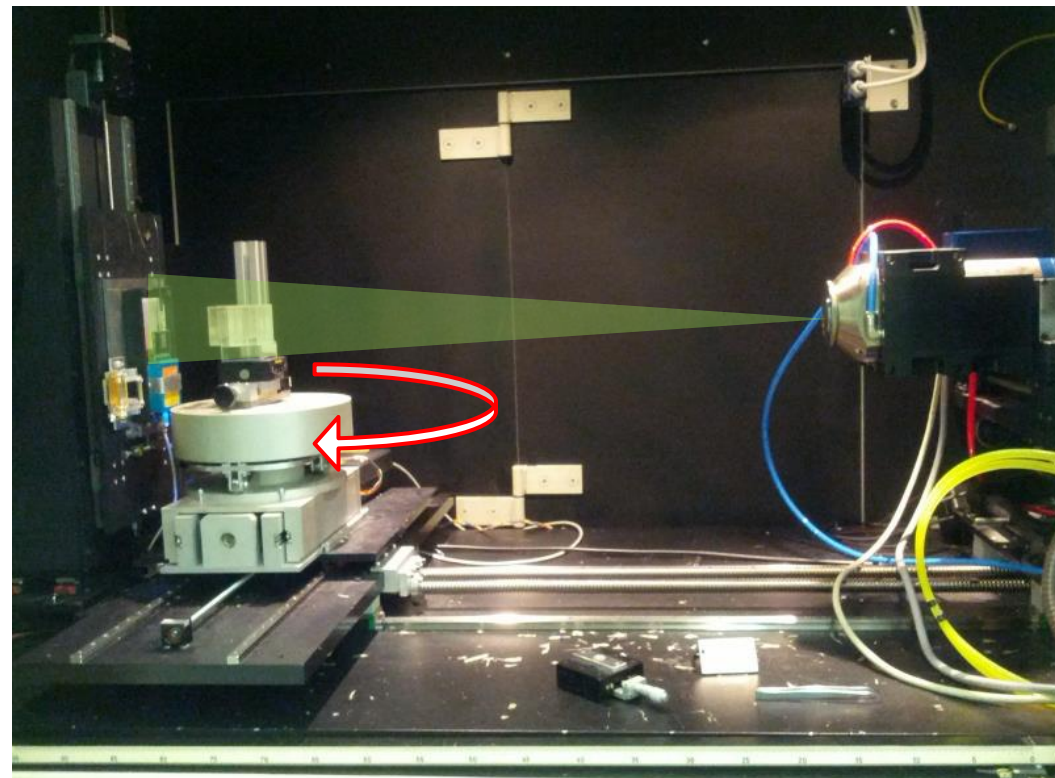
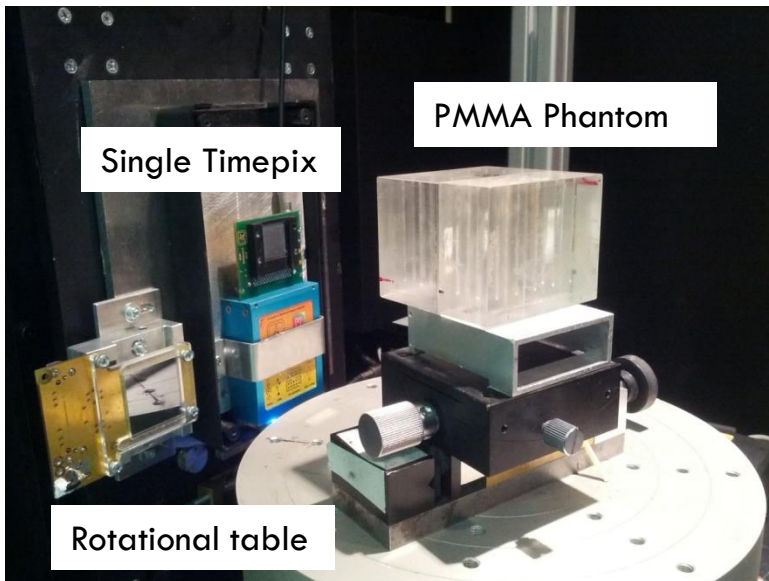


Actual seed images  
obtained from single pinhole

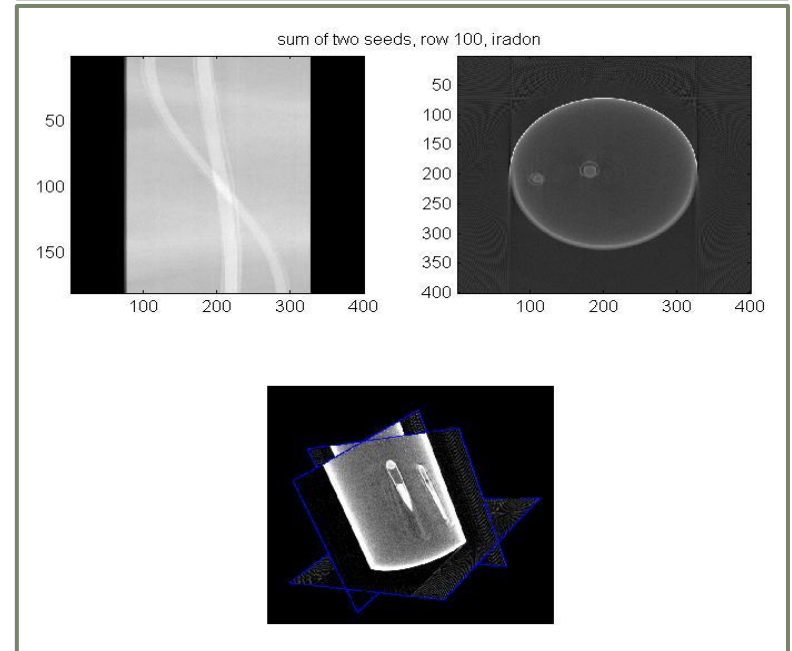
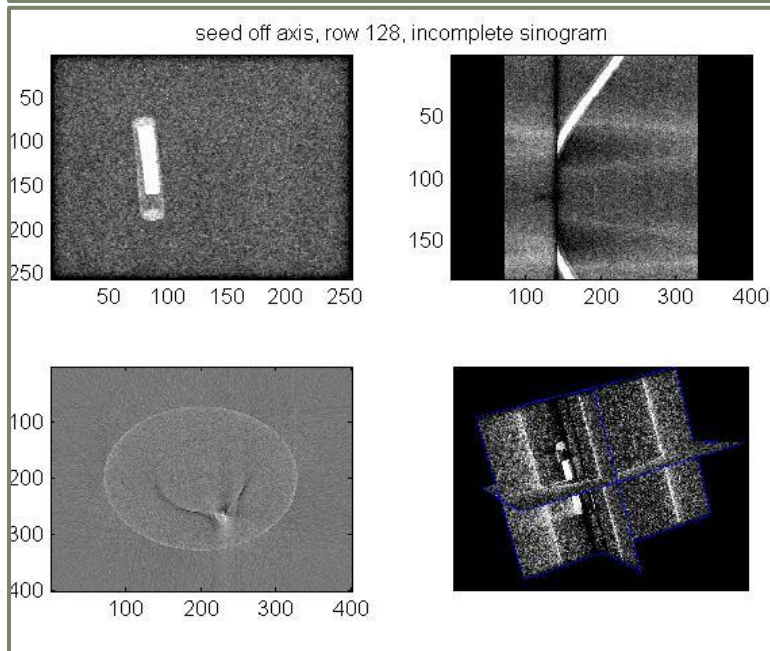
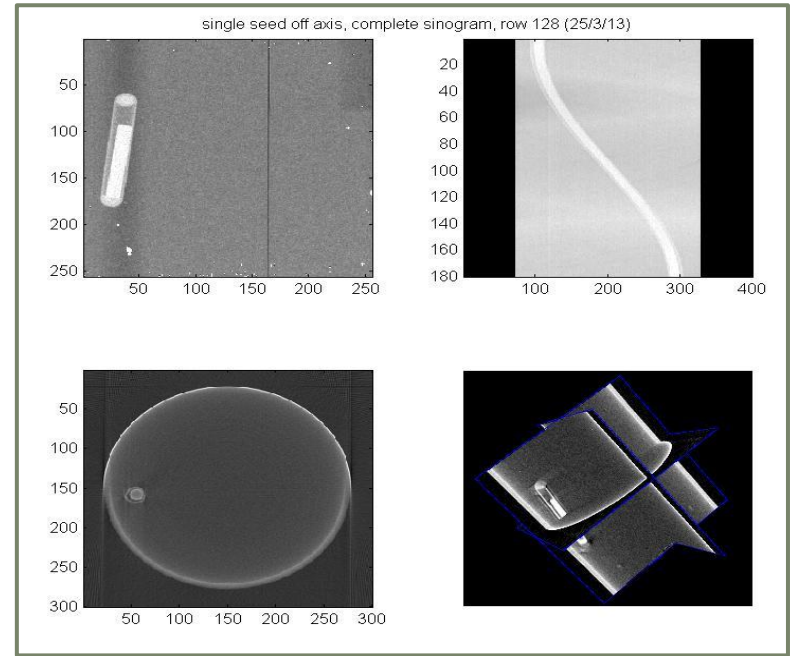
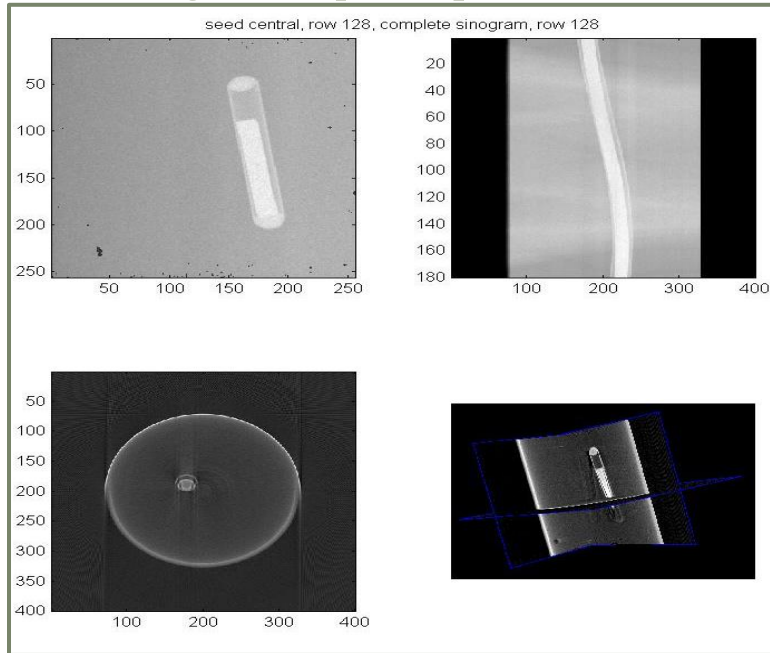
Coordinates of brachy source  
given in three dimensions

# Tomographic measurements

- CT imaging has significant role to play in post-implant dosimetry
- Perform phantom measurements to verify use of small in-body imaging plane

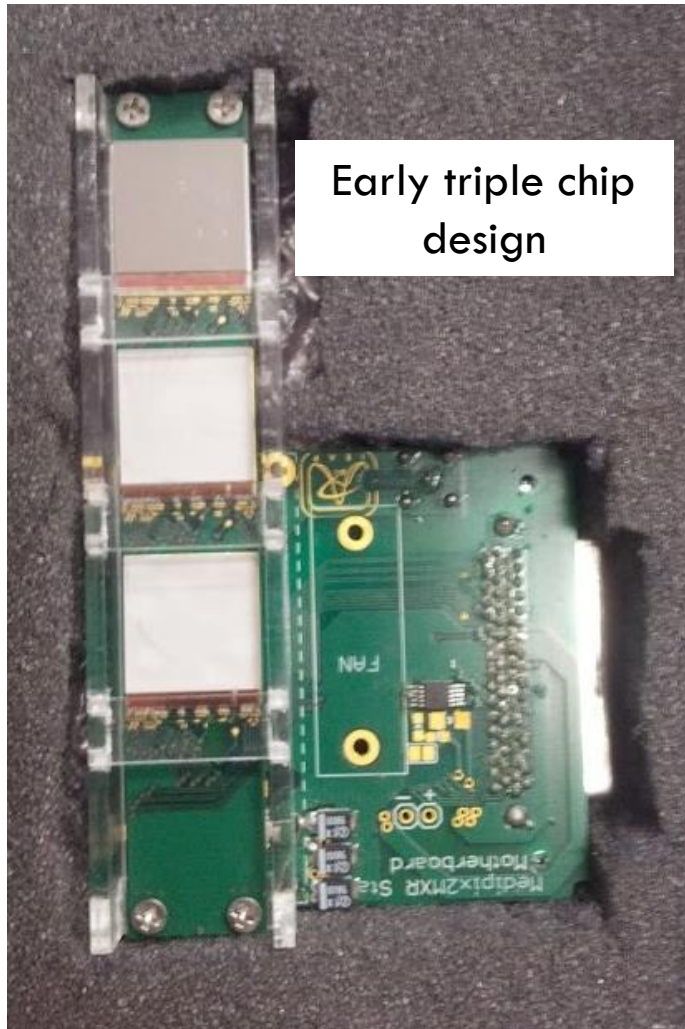


# Tomography





# Multichip Assemblies

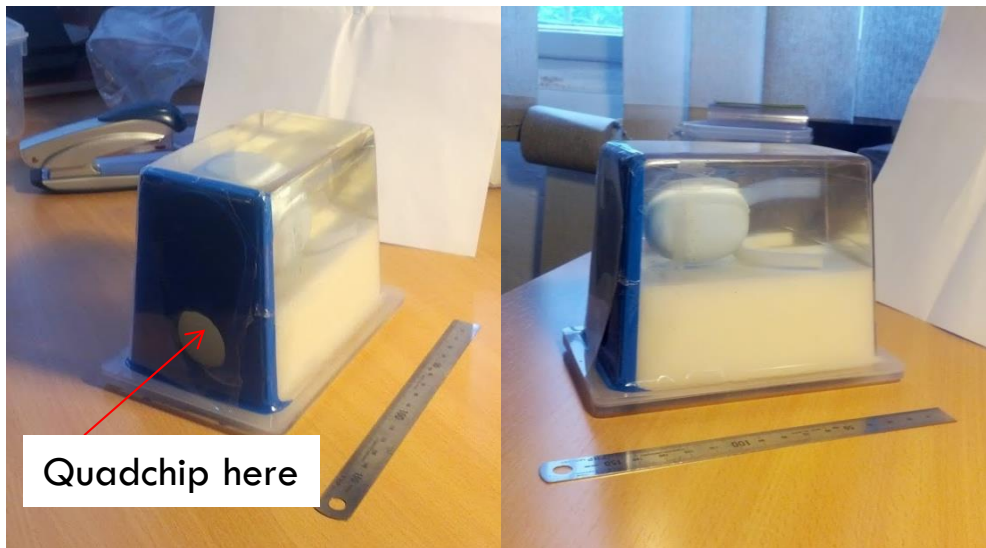


- Development of unique multi-chip assemblies for use in BrachyView (i.e. For hardware integration in existing ultrasound probe design)



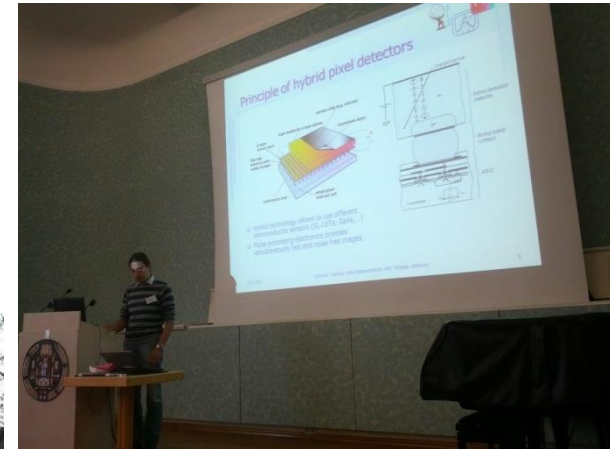
# Progress: Experimental Work

- Medical prostate phantom used for ultrasound training has anatomically accurate features (prostate, urethra, seminal vesicles)
- Useful for proposed investigation in colour x-ray spectroscopic imaging



# Workshop on Gamma Dose – University of Freiburg, May 13-15

- Discussion of environmental measurements of gamma dose and alerting systems, particularly public awareness
- Particular focus on Fukushima accident and systems such as EURDEP

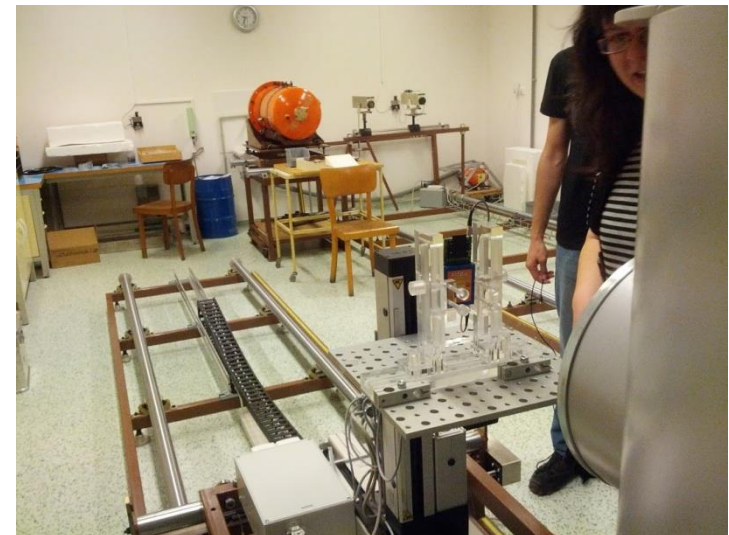
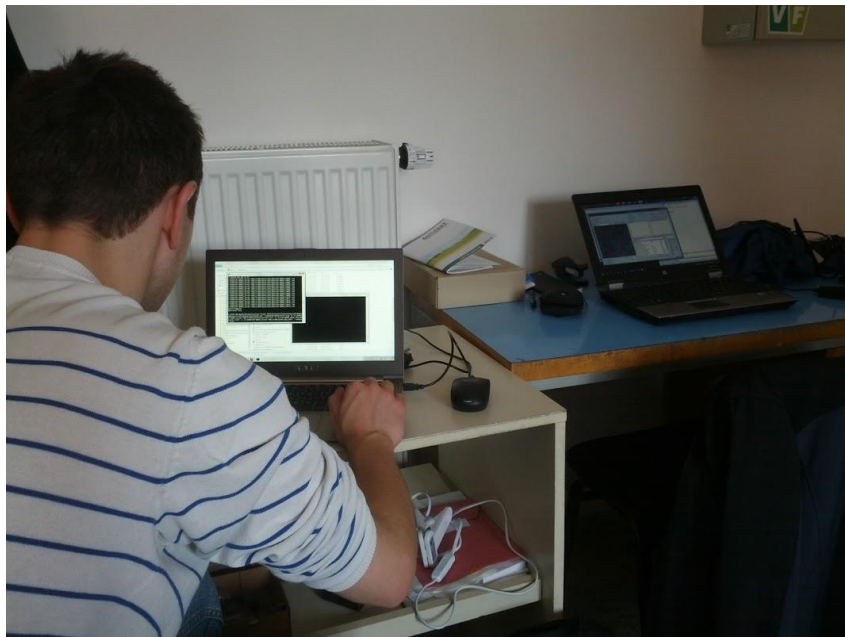
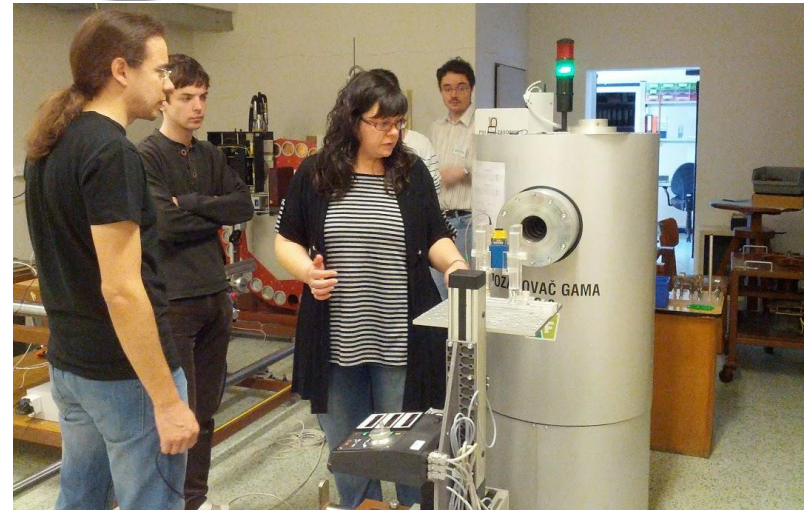


# Collaboration with SURO



Státní ústav radiální ochrany, v. v. i.  
National Radiation Protection Institute

- Measurements of mixed radiation fields and X-ray sources
- Ongoing collaboration with neighbouring institute (approx. 25 minutes away)

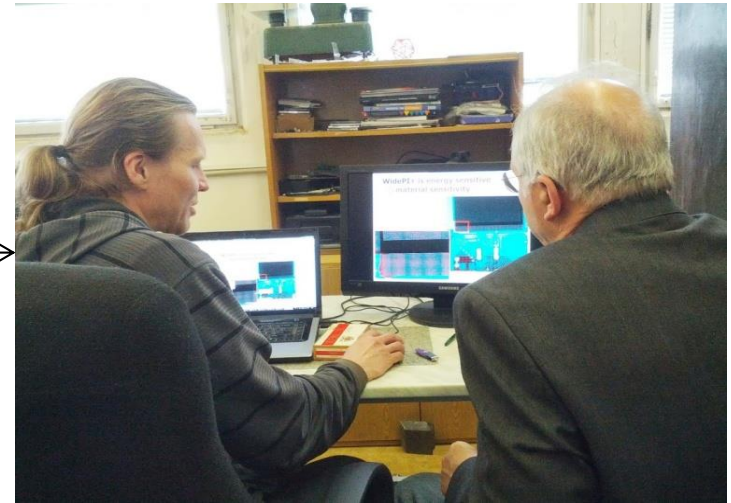


# Ongoing International Collaboration

- Visit to Australia March 29-April 20
- Prof Anatoly Rosenfeld visit to Prague May 30-June 2



Meetings with  
Prof. Rosenfeld  
and Dr Jan  
Jakubek

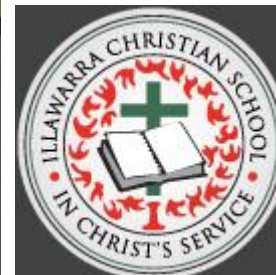


Discussing  
experiments with  
medical prostate  
phantom with  
Australian co-  
supervisors



# Outreach

- Invited talks to:
  - Australian Rotary Club (Parramatta Chapter)
  - Illawarra Christian School, Senior High Physics Class



# Future Work

- Finalisation of PhD Thesis
- 3 publications currently under construction
  - ▣ GEANT4 simulations
  - ▣ Tomographic reconstruction
  - ▣ Spectroscopic imaging for treatment planning and dosimetry quality assurance
- Possibility of developing detectors for space applications (ESA) and neutron dosimetry
- Oral presentations at SSD, Brazil (September) and IEEE, NSS-MIC, Seoul (October)

THANK YOU!

