

# Curriculum Vitae

Iavor Veltchev, Ph.D., DABR  
Associate Professor, Medical Physicist

## CONTACT INFORMATION

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## EDUCATION AND SUMMARY OF QUALIFICATIONS

- American Board of Radiology**  
2013 DABR - Therapeutic Medical Physics
- Medical Physics Residency**  
2008–2010 Fox Chase Cancer Center, Department of Radiation Oncology
- Ph.D. in Physics**  
June 2001 School: Vrije Universiteit Amsterdam, The Netherlands  
Subject: Optical, Atomic and Laser Physics  
Thesis title: “Stimulated Brillouin scattering pulse compression and high-order harmonic generation: applications to precision XUV laser spectroscopy”
- M.Sc. in Physics and Dipl. Engineer**  
July 1994 School: Sofia University, Faculty of Physics, Department of Quantum Electronics  
Subject: Quantum Electronics and Laser Technologies  
Thesis title: “Numerical modeling and experimental investigation of the generation and evolution of dark spatial solitons”

## PROFESSIONAL EXPERIENCE / CAREER HISTORY

- June 2010 – present** **Fox Chase Cancer Center, Radiation Oncology Department**  
**Position:** Assistant Professor/Medical Physicist  
**Projects:** CyberKnife service leader (August 2022 – )  
Developing treatment plans for robotic radiosurgery and SBRT  
HDR service leader (June 2014 – July 2022)  
(Bravos, VariSourceIX; Vitesse, BrachyVision; Nucletron)  
Patient-specific 2D QA of IMRT and VMAT treatment plans  
In-vivo dosimetry service leader (OSLD, TLD, MOSFET)  
IMRT beam modeling for Eclipse, CMS-XIO  
Clinical implementation of Monte Carlo dose calculations  
Proton and heavy ion dosimetry
- June 2008 – June 2010** **Fox Chase Cancer Center, Radiation Oncology Department**  
**Position:** Medical Physics Resident  
**Project:** Proton and heavy ion dosimetry

Clinical implementation of Monte Carlo dose calculations

- Fox Chase Cancer Center, Laser Center**  
 April 2004 – May 2008  
 Position: Associate Member/Project Leader  
 Project: Laser proton acceleration  
 High-intensity laser-matter interactions
- Lehigh University, Department Of Physics**  
 Oct 2001 – Mar 2004  
 Position: Postdoctoral  
 Project: Distributed Raman amplification and competing nonlinearities in optical fibers
- Vrije Universiteit, Amsterdam, Atomic Physics Group**  
 June 2001 – Sept 2001  
 Position: Postdoctoral  
 Project: Development of tunable narrow-band extreme ultraviolet (XUV) laser source
- Vrije Universiteit, Amsterdam, Atomic Physics Group**  
 Feb 1997 – June 2001  
 Position: PhD-student  
 Project: Development of tunable narrow-band soft-X-ray laser source; Precision frequency calibration; VUV laser spectroscopy.
- Vrije Universiteit, Amsterdam, Atomic Physics Group**  
 Oct 1996 – Dec 1996  
 Position: Visiting physicist  
 Project: Pulse compression by stimulated Brillouin scattering
- Sofia University, Department Of Physics**  
 March 1996 – May 1996  
 Position: Research physicist  
 Project: Multiply-charged optical vortex solitons
- Sofia University, Department Of Physics**  
 Sept 1994 - March 1995  
 Position: Research physicist  
 Project: Interactions of optical vortex solitons
- Sofia University, Department Of Physics**  
 Sept 1994 - March 1995  
 Position: Undergraduate research student  
 Project: Theoretical and experimental investigation of dark spatial solitons

## PROFESSIONAL AFFILIATION AND CERTIFICATIONS

- 2018 – present Member of the American Society for Radiation Oncology (ASTRO)  
 2008 – present Member of the American Association of Physicists in Medicine (AAPM).  
 2003 – 2010 Member of the Optical Society of America (OSA).  
 1999 – 2003 Member of the Union of Physicists in Bulgaria / European Physical Society.
- June 2013 American Board of Radiology (ABR) - Certified, Therapeutic Medical Physics

## PROFESSIONAL CONTRIBUTIONS

- **Committee appointments:**
  - 2019 – present ASTRO Prostate/GU resource pannel
- **Clinical trials:**
  - 2014 – present IRB #13-030 - PET-CT in Determining Dose Delivered to Patients With Liver Metastasis, Primary Liver Cancer, or Biliary Cancer.

- **Reviewer** for the following peer-reviewed journals:  
*Medical Physics, Brachytherapy, Journal of Applied Clinical Medical Physics, Physical Review Letters, Physical Review A, Physical Review E, Optics Letters, Optics Communications, Photonics Technology Letters, Journal of Lightwave Technology, Optics Express.*
- **39 peer-reviewed publications** in physics journals since 1995 (see the list of publications).
- **More than 950 citations** and an h-index of 20 (ResearcherID #A-2320-2008).
- **16 peer-reviewed oral presentations** at conferences (see the list of publications).
- **more than 15 years** of judging at the Delaware Valley Science Fairs.

## AWARDS AND GRANTS

- U.S. Patent – “Methods and Systems for Increasing the Energy of Positive Ions Accelerated by High-Power Lasers”  
September 2012 Patent #8,269,189 B2
- Young Investigator Award - First prize  
December 2009 AAPM (Delaware Valley Chapter)
- An European Union grant for access to Large-scale Laser Facilities  
March 2000 Lund Institute of Technology, Lund, Sweden
- Graduated with the highest honors (Summa Cum Laude)  
July 1994 Sofia University, Dept. Quantum Electronics

## TEACHING EXPERIENCE

- Radiation Physics Lecture Series for Radiation Oncology Residents  
2004–present Fox Chase Cancer Center, Department of Radiation Oncology
- Introduction to Monte Carlo Treatment Planning  
2005–present Fox Chase Cancer Center, Department of Radiation Oncology
- Adjunct Professor, “Modern Optics” (Graduate level course)  
Fall 2009 Lehigh University, Department of Physics
- Ph.D. Thesis co-advisor, Lehigh University, Department of Physics  
2004–2008 Yan Yan  
“Propagation of Light in Linear and Nonlinear Regime in Multicore Photonic Crystal Fibers”
- Ph.D. Thesis co-advisor, Lehigh University, Department of Physics  
2008–2011 Cyril L. Guintrand  
“Raman-Assisted Optical Parametric Amplification in Optical Fibers”
- Summer-student advisor, Fox Chase Cancer Center  
2016 Adam Anderson  
“Transfer of GTV contours from planning to post-treatment CT for radioembolization patients”

## INVITED PRESENTATIONS

- AAPM Spring Clinical Meeting (March 2019) “Planning of CivaSheet LDR treatments”
- Radiation Oncology Conference for Nurses, Therapists and Dosimetrists (October 27, 2017) “Particle Therapy: Applications and Challenges”
- Delaware Valley Society for Radiation Safety (May 20, 2016) “Physical Aspects and Clinical Applications of Post-Treatment Yttrium-90 PET-Based Dosimetry”

- Radiation Service Engineers' Association, Educational Symposium (July 2010) "Acceleration of Protons with Ultra-Intense Laser Pulses: Applications in Cancer Therapy"
- Lehigh University Colloquium (October 22, 2009) "Acceleration of Protons with Ultra-Intense Laser Pulses: Applications in Cancer Therapy"
- Fox Chase Cancer Center (September 25, 2003) "Powerful laser sources for extreme laser-matter interactions"
- Lehigh University Colloquium (October 26, 2001) "Pulse compression by Stimulated Brillouin scattering in liquids"

## RESEARCH INTERESTS

- Medical Physics:
  - Brachytherapy (HDR and radioembolization with  $^{90}\text{Y}$  microspheres)
  - Civa-sheet dosimetry and applications
  - $\beta^+$  activation of tissues exposed to high energy photon, or particle beams
  - Clinical applications of Mote Carlo dose calculation techniques.
  - Applications of protons and heavy ions in radiation therapy.
  - Quality assurance for IMRT and VMAT radiation treatments.
  - Planar and volumetric dosimetry of X-rays.
  - Advanced optimization algorithms and applications for IMRT.
  - Applications of nano-particles and radio-sensitizers in radiation therapy.
  - Photodynamic therapy.
  - Intensity modulated proton and carbon ion therapy (optimization and delivery).
  - Radiobiological efficiency of heavy ions.
  - Shielding of Heavy Ion Radiation Therapy Facilities.
  - IGRT and target localization techniques.
  - Proton/ion dose reconstruction using PET imaging.
  - Calculation of dose for microsphere treatments of hepatic tumors.
- Numerical modeling of nonlinear processes:
  - Cancer cell proliferation
  - Cell response to radiation damage

## SUMMARY OF TECHNICAL SKILLS

- Radiation therapy equipment
  - Linacs:
    - Varian (Clinac iX, Trilogy, 21EX)
    - Elekta (Versa HD)
    - Siemens (Primus, Artiste)
    - Accuray (CyberKnife)
  - HDR Brachytherapy:
    - Varian (Bravos, VariSourceIX)
    - Nucletron (MicroSelectron V2)
  - Dosimetry:
    - Ion chambers, MatriXX (IBA), Profiler (Sun Nuclear), Film, TLD, MOSFET
    - PTW water scanner, protocols (TG21, TG25, TG43U, TG51, TG142)
  - R&V:
    - Mosaiq
  - Treatment Planning:
    - Eclipse, BrachyVision, Vitesse, CMS-XIO, Oncentra, MultiPlan,
    - Custom Monte-Carlo code
  - IGRT:
    - RPM(Varian), VisionRT, Cone-beam CT
- Computers

Operating Systems: UNIX/Linux, OSX/Windows  
Programming Languages: C++, Python, Java, JavaScript (Node.js), C#, FORTRAN  
Monte Carlo Codes: FLUKA, Geant4, EGS4, EGSNRC  
website design and maintenance  
diverse hardware knowledge