Quantum For Health Launch Event

Case Study Presenters



Mohammad Kohandel



Raffi Budakian



Michael Reimer



Michal Bajcsy



Jelena Mirkovic



Subha Kalyaanamoorthy



Connor Kapahi



Troy Borneman





Mohammad Kohandel

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Biomedical applications of quantum sensors (M. Kohandel, UW)

Quantum sensors have provided an incredible opportunity to build powerful tools for biomedical diagnostics, including virus detection, early cancer detection, and personalized medicine!









Raffi Budakian

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Professor Department of Physics and Astronomy, University of Waterloo COMING SOON!





Michael Reimer

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Associate Professor Department of Electrical and Computer Engineering, University of Waterloo

Quantum sensing for health TQT











Dose monitoring for cancer treatment



P.R. Ogilby, Chem. Soc. Rev. **39**, 3181-3209 (2010)

Eye imaging using OCT



Courtesy of K. Bizheva UWaterloo Physics





Michal Bajcsy

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Polarization-dichroic mirrors for circularly polarized light



Light: Science & Applications 9, 1-12 (2020)





... possible application: optical resonators for enhanced detection of chiral molecular isomers (w/ specific handedness) for *enantiopure medications*





Michal Bajcsy (https://npqo.weebly.com)





Jelena Mirkovic

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Subha

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Q4Health

 By 2050, nearly 2 million Canadians could be living with some form of dementia¹.



C.

Can we develop quantum-based materials as specific diagnostics and therapeutics for neurodegeneration?

¹Navigating the path forward for dementia in Canada-Report 1-Alzheimer's society of Canada. 2022



Can quantum technologies help in efficient screening of drug candidates?

²Sun et al., Acta Pharmaceutica Sinica B., 12(7), 3049-3062, 2022.





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Quantum Technologies

Applied to

Vision Healthcare











Without Polarizer



With Polarizer



Quantum Opportunities • Structured waves are used in quantum

- Structured waves are used in quantum information processing
- Polarization structures can be created by combining structured wave of different polarization states
- Structured light can be tailored to investigate the macula or other regions of the retina



Outlook

- What disorders can be investigated with structured light?
- How can a structured light device be integrated in vision health clinics?
- Who is willing to pay for early diagnostics of retinal disorders?

Quantum Opportunities

- Structured waves are used in quantum information processing
- Polarization structures can be created by combining structured wave of different polarization states
- Structured light can be tailored to investigate the macula or other regions of the retina





Troy Borneman

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Senior Scientist High Q Technologies

Superconducting Quantum Sensors for Protein Biophysics





Dipolar Distance Measurement for Protein Conformational Changes





