

Bence Gábor MÁRKUS

Postdoctoral Research Associate
Stavropoulos Center for Complex Quantum Matter $\diamond$ Department of Physics & Astronomy
University of Notre Dame
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SCHOLARLY IMPACT

50 published manuscripts $\diamond$ 723 citations $\diamond$ h-index: 17 $\diamond$ i10-index: 27 according to Google Scholar as of June 8, 2026.

RESEARCH EXPERIENCE

Postdoctoral Research Associate

September 2021-

Stavropoulos Center for Complex Quantum Matter, Department of Physics & Astronomy, University of Notre Dame

- Spin dynamics, spin transport, and spin control in graphite, graphene, and doped carbon-based materials; *Graphitronics*
- Synthesis and physical characterization of MXenes, with emphasis on electronic, magnetic, and optical properties
- Ion transport and electronic properties of functionalized hexagonal boron nitride and doped derivatives
- Electronic structure, magnetic ordering, and spin-dependent phenomena in altermagnets and emerging magnetic materials
- Light-driven control of charge, spin, and magnetic order in layered magnetic semiconductors and photovoltaic materials
- Spin-label-based detection strategies for nano- and microplastics using inorganic probes
- Emergent superconducting phases and unconventional superconductivity in transition-metal dichalcogenides
- Role of defects, disorder, and interfaces in governing electronic, magnetic, and transport properties of solids
- Magneto-optical manipulation of solid-state qubits for quantum sensing and quantum information applications

Postdoctoral Research Fellow

January 2021-August 2021

Institute for Solid State Physics and Optics, Wigner Research Centre for Physics

- Synthesis, electronic structure, and superconducting properties of graphene-based quantum materials
- Silicon-carbide-based defect qubits and quantum dots for quantum sensing and quantum information applications

Research Assistant

September 2013-November 2020

Budapest University of Technology and Economics

- Spin and charge transport in alkali-doped few-layer graphene for spintronics and energy-storage applications
- Optical-spectroscopy-based determination of layer number and doping effects in few-layer graphene using *in situ* potassium doping
- Alkali-metal intercalation of layered materials using vapor-phase and liquid-ammonia-based synthetic approaches

- Diamond nitrogen-vacancy centers, SiC-based defect qubits, and quantum dots for quantum sensing and quantum information applications
- Electronic structure, magnetic response, and optical properties of black phosphorus and low-dimensional quantum materials
- Curvature-, defect-, and dopant-driven spin relaxation mechanisms in carbonaceous materials, including graphite, graphene, and carbon nanotubes
- Development and implementation of microwave conductivity and RF-impedance techniques for investigating dynamic electronic and spin-dependent phenomena

RESEARCH INTERESTS

Condensed matter physics $\diamond$ quantum materials $\diamond$ spintronics $\diamond$ altermagnets and correlated magnetic phases $\diamond$ magnetic phase transitions $\diamond$ spin-dependent transport $\diamond$ spin-orbit coupling $\diamond$ magnetoresistance $\diamond$ unconventional superconductivity $\diamond$ bulk and nanomaterials synthesis $\diamond$ interfacial and defect-driven phenomena $\diamond$ quantum sensing $\diamond$ materials for energy storage and harvesting.

EDUCATION

Doctor of Philosophy in Physical Sciences (*summa cum laude*)

November 2020

Budapest University of Technology and Economics

Dissertation title: Spin and Charge Dynamics in Novel Low-Dimensional Materials

Advisor: Prof. Ferenc Simon

Master of Science in Physics (*with honors*)

June 2015

Eötvös Loránd University

specialization in Condensed Matter Physics, Materials Physics, and Molecular Physics

Bachelor of Science in Physics (*with honors*)

July 2013

Eötvös Loránd University

SELECTED PUBLICATIONS

- $\diamond$ 2026 **B. G. Márkus**, B. J. McIntosh, L. Vajtai, A. Nyáry, S. H. Sipos, N. J. Ghimire, F. Simon, L. Forró, D. Beke: **Titanium Suboxides Responsible for Electronic Anomaly Near Room Temperature in the $\text{Ti}_3\text{C}_2\text{T}_x$ MXene**, *Advanced Functional Materials*, e75802 (2026). Corresponding author.
- $\diamond$ 2025 **B. G. Márkus**, D. Beke, L. Vajtai, A. Jánosy, L. Forró, F. Simon: **Unprecedented Spin-Lifetime of Itinerant Electrons in Natural Graphite Crystals**, *Advanced Functional Materials* **36**(18), e16953 (2025).
- $\diamond$ 2025 B. J. McIntosh, **B. G. Márkus**, A. Nyáry, F. Simon, L. Forró, D. Beke: **Surface Chemistry-Driven Oxidation Mechanisms in $\text{Ti}_3\text{C}_2\text{T}_x$ MXenes**, *Small Science* **5**(8), 2500209 (2025). Equal contribution with the first author.
- $\diamond$ 2025 R. B. Regmi, H. Bhandari, B. Thapa, Y. Hao, N. Sharma, J. McKenzie, X. Chen, A. Nayak, M. El Gazzah, **B. G. Márkus**, L. Forró, X. Liu, H. Cao, J. F. Mitchell, I. I. Mazin, N. J. Ghimire: **Altermagnetism in the layered intercalated transition metal dichalcogenide CoNb_4Se_8** , *Nature Communications* **16**, 4399 (2025).
- $\diamond$ 2024 S. Kollarics, **B. G. Márkus**, R. Kucsera, G. Thiering, A. Gali, G. Németh, K. Kamarás, L. Forró, F. Simon: **Terahertz Emission from Diamond Nitrogen-Vacancy Centers**, *Science Advances* **10**(22), eadn0616 (2024).
- $\diamond$ 2023 **B. G. Márkus**, M. Gmitra, B. Dóra, G. Csősz, T. Fehér, P. Szirmai, B. Náfrádi, V. Zólyomi, L. Forró, J. Fabian, F. Simon: **Ultralong 100 ns spin relaxation time in graphite at room temperature**, *Nature Communications* **14**, 2831 (2023).

- ◇ 2022 A. Bojtor, S. Kollarics, **B. G. Márkus**, A. Sienkiewicz, M. Kollár, L. Forró, F. Simon: **Ultralong Charge Carrier Recombination Time in Methylammonium Lead Halide Perovskites**, *ACS Photonics* **9**(10), 3341-3350 (2022).
- ◇ 2020 **B. G. Márkus**, P. Szirmai, K. F. Edelthammer, P. Eckerlein, A. Hirsch, F. Hauke, N. M. Nemes, Julio C. Chacón-Torres, B. Náfrádi, L. Forró, T. Pichler, F. Simon: **Ultralong Spin Lifetime in Light Alkali Atom Doped Graphene**, *ACS Nano* **14**(6), 7492-7501 (2020).

PUBLICATIONS

Preprints

- 1 2026 **B. G. Márkus**, A. Nyáry, D. Beke, S. Radhakrishnan, V. R. Tatagari, B. J. McIntosh, C. Chen, B. Zsirka, M. Y. Teferi, J. Niklas, O. G. Poluektov, I. D. Bloom, F. Dogan, M. Kovács, F. Simon, G. Szalontai, L. Shaw, L. Forró, K. Németh: **Highly Efficient Functionalization of hBN with Lithium Oxalate: A Multifunctional Platform for Composites, Ion Transport, and Spin Labeling**, *under review at Advanced Materials* (2026). Corresponding author.
- 2 2026 B. Göblyös, S. Kollarics, R. Kucsera, D. Plitt, K. Koltai, **B. G. Márkus**, L. Forró, F. Simon: **Telecom-Wavelength-Compatible Quantum Information Transcription Using Nitrogen-Vacancy Centers**, *under review at Advanced Optical Materials* (2026). Corresponding author.
- 3 2026 K. Yoshimura, T-C. Hsieh, H. Ma, D. V. Chichinadze, S. Zou, M. Stuckert, D. Graf, R. Nowell, M. Abdul Karim, D. Kozawa, R. Kitaura, **B. G. Márkus**, L. Forró, X. Liu, D. Jin, X. Liu, C. Lewandowski, Yi-Ting Hsu, Badih A. Assaf: **g-Factor-Enhanced Upper Critical Field in Superconducting PdTe₂ due to Quantum Confinement**, *under review at ACS Nano* (2026).
- 4 2026 S. Bey, S. S. Fields, N. G. Combs, **B. G. Márkus**, J. Wang, L. Schmidt, L. Curtis, A. Dodd-Noble, A. Poulin, S. M. Shahed, R. Regmi, M. Holub, P. Ohresser, A. Bansil, S. Kar, H. Ambaye, V. Lauter, L. Forró, C. D. Cress, J. C. Prestigiacomo, N. J. Ghimire, A. de la Torre, S. P. Bennett, X. Liu, B. A. Assaf: **Conductivity scaling of the anomalous Hall effect in the altermagnetic semiconductor α -MnTe**, *under review at Physical Review Letters* (2026).
- 5 2026 R. B. Regmi, S. Jamaluddin, Y. Lee, H. Bhandari, P.-H. Chang, P. E. Siegfried, A. Nayak, M. El Gazzah, **B. G. Márkus**, A. Nyáry, Z. Messenger, M. P. Zhao, X. Tan, L. Forró, L. Ke, I. I. Mazin, N. J. Ghimire: **Anisotropy, frustration and saddle point in the twisted kagome antiferromagnet ErPdPb**, *under review at Physical Review Materials* (2026).
- 6 2026 A. Nayak, S. Jamaluddin, F. Wu, E. Rapp, R. B. Regmi, M. El Gazzah, **B. G. Márkus**, L. Forró, M. P. Ghimire, A. Oliver, K. Foyevtsova, I. I. Mazin, N. J. Ghimire: **Crystal Growth and Physical Properties of Orthorhombic Kagome Lattice Magnets RFe₆Ge₆ (R=Y, Tb, Dy)**, *under review at Advanced Science* (2026).
- 7 2025 L. Vajtai, N. M. Nemes, M. del Puerto Morales, **B. G. Márkus**, L. Forró, F. Simon: **Magnetic Dissipation in Ferrofluids**, *arXiv preprint: arXiv:2506.05028* (2025).
- 8 2024 S. Bey, S. S. Fields, N. G. Combs, **B. G. Márkus**, D. Beke, J. Wang, A. V. Ievlev, M. Zhukovskyi, T. Orlova, L. Forró, S. P. Bennett, X. Liu, B. A. Assaf: **Unexpected Tuning of the Anomalous Hall Effect in Altermagnetic MnTe thin films**, *arXiv preprint: arXiv:2409.04567* (2024).

Published

- 9 2026 **B. G. Márkus**, B. J. McIntosh, L. Vajtai, A. Nyáry, S. H. Sipos, N. J. Ghimire, F. Simon, L. Forró, D. Beke: **Titanium Suboxides Responsible for Electronic Anomaly Near Room Temperature in the Ti₃C₂T_x MX-ene**, *Advanced Functional Materials*, e75802 (2026). Corresponding author.
- 10 2026 **B. G. Márkus**, S. Kollarics, K. Kály-Kullai, B. Juhász, D. Beke, L. Forró, Z. Noszticzius, F. Simon: **Transient Plastic Spin Labeling with Chlorine Dioxide**, *ACS Physical Chemistry Au* **6**(2), 348-355 (2026). Corresponding author; Cover feature.

- 11 2026 A. Bojtör, D. Krisztián, G. Paráda, F. Korsós, S. Kollarics, G. Csősz, B. G. Márkus, L. Forró, F. Simon: **A Versatile System for Photoconductance Decay Measurement Across a Wide Range of Semiconductor Materials**, *Physical Review Applied* **25**, 014055 (2026). Editor's Suggestion.
- 12 2026 R. Lózsa, E. Németh, Z. Szeltner, R. Martinek, Á. Póti, B. Szikriszt, J. Gervai, S. Kollarics, B. G. Márkus, K. Berta, Zs. Sztupinszki, F. Simon, Z. Szallasi, A. Richardson, D. Szüts: **Long-term exposure to the ethanol-derived metabolite acetaldehyde elevates structural genomic alterations in human cells but does not induce base substitutions**, *Communications Biology* **9**, 243 (2026).
- 13 2026 S. M. Bezerra, S. Kollarics, L. S. Almeida, G. Bortel, N. Jegenyés, B. G. Márkus, F. Simon, A. Gali, D. Beke: **Role of Aluminum in Controlling Defect Formation and Polytypism in Silicon Carbide via Thermal Synthesis**, *Materials Advances* **7**, 783-797 (2026).
- 14 2025 B. G. Márkus, D. Beke, L. Vajtai, A. Jánossy, L. Forró, F. Simon: **Unprecedented Spin-Lifetime of Itinerant Electrons in Natural Graphite Crystals**, *Advanced Functional Materials* **36**(18), e16953 (2025).
- 15 2025 B. J. McIntosh, B. G. Márkus, A. Nyáry, F. Simon, L. Forró, D. Beke: **Surface Chemistry-Driven Oxidation Mechanisms in $\text{Ti}_3\text{C}_2\text{T}_x$ MXenes**, *Small Science* **5**(8), 2500209 (2025). Equal contribution with the first author.
- 16 2025 R. B. Regmi, H. Bhandari, B. Thapa, Y. Hao, N. Sharma, J. McKenzie, X. Chen, A. Nayak, M. El Gazzah, B. G. Márkus, L. Forró, X. Liu, H. Cao, J. F. Mitchell, I. I. Mazin, N. J. Ghimire: **Altermagnetism in the layered intercalated transition metal dichalcogenide CoNb_4Se_8** , *Nature Communications* **16**, 4399 (2025).
- 17 2025 H. Bhandari, P.-H. Chang, R. B. Regmi, B. G. Márkus, L. Forró, J. F. Mitchell, I. I. Mazin, N. J. Ghimire: **Tunable topological transitions in the frustrated magnet HoAgGe** , *Communications Materials* **6**, 52 (2025).
- 18 2024 A. Bojtör, D. Krisztián, F. Korsós, S. Kollarics, G. Paráda, M. Kollár, E. Horváth, X. Mettan, B. G. Márkus, L. Forró, F. Simon: **Dynamics of Photoinduced Charge Carriers in Metal-Halide Perovskites**, *Nanomaterials* **14**(21), 1742 (2024).
- 19 2024 A. Bojtör, D. Krisztián, F. Korsós, S. Kollarics, G. Paráda, T. Pinel, M. Kollár, E. Horváth, X. Mettan, H. Shiozawa, B. G. Márkus, L. Forró, F. Simon: **Millisecond-Scale Charge-Carrier Recombination Dynamics in the CsPbBr_3 Perovskite**, *Advanced Energy and Sustainability Research*, **5**(7), 2400043 (2024).
- 20 2024 S. Kollarics, B. G. Márkus, R. Kucsera, G. Thiering, A. Gali, G. Németh, K. Kamarás, L. Forró, F. Simon: **Terahertz Emission from Diamond Nitrogen-Vacancy Centers**, *Science Advances* **10**(22), eadn0616 (2024).
- 21 2024 L. Rossi, E. Horváth, T. Wang, C. Grimaldi, A. Sienkiewicz, B. G. Márkus, D. Beke, L. Forró: **Tuning the Color of High-Karat Gold in Au-TiO_2 Nanoparticles Composites All the Way to Black**, *iScience* **27**(5), 109655 (2024). Corresponding author.
- 22 2023 R. Lózsa, E. Németh, J. Gervai, B. G. Márkus, S. Kollarics, Zs. Gyüre, J. Tóth, F. Simon, D. Szüts: **DNA mismatch repair protects the genome from oxygen-induced replicative mutagenesis**, *Nucleic Acids Research* **51**(20), 11040–11055 (2023).
- 23 2023 N. Mukesh, B. G. Márkus, N. Jegenyés, G. Bortel, S. M. Bezerra, F. Simon, D. Beke, A. Gali: **Formation of Paramagnetic Defects in the Synthesis of Silicon Carbide**, *Micromachines* **14**(8), 1517 (2023).
- 24 2023 B. G. Márkus, M. Gmitra, B. Dóra, G. Csősz, T. Fehér, P. Szirmai, B. Náfrádi, V. Zólyomi, L. Forró, J. Fabian, F. Simon: **Ultralong 100 ns spin relaxation time in graphite at room temperature**, *Nature Communications* **14**, 2831 (2023).
- 25 2022 A. Bojtör, S. Kollarics, B. G. Márkus, A. Sienkiewicz, M. Kollár, L. Forró, F. Simon: **Ultralong Charge Carrier Recombination Time in Methylammonium Lead Halide Perovskites**, *ACS Photonics* **9**(10), 3341-3350 (2022).
- 26 2022 M. M. Rudolf, G. Bortel, B. G. Márkus, N. Jegenyés, V. Verkhovlyuk, K. Kamarás, F. Simon, A. Gali, D. Beke: **Optimization of Chromium-Doped Zinc Gallate Nanocrystals for Strong Near-Infrared Emission by Annealing**, *ACS Applied Nano Materials* **5**(7), 8950-8961 (2022).

- 27 2022 T. Veres, C. Voniatis, K. Molnár, D. Nesztor, D. Fehér, A. Ferencz, I. Gresits, Gy. Thuróczy, **B. G. Márkus**, F. Simon, N. M. Nemes, M. García-Hernández, L. Reiniger, I. Horváth, D. Máthé, K. Szigeti, E. Tombácz, A. Jedlovsky-Hajdu: **An Implantable Magneto-Responsive Poly (aspartamide) Based Electrospun Scaffold for Hyperthermia Treatment**, *Nanomaterials* **12**(9), 1476 (2022).
- 28 2022 Zs. Iszály, I. Gresits, I. G. Márián, Gy. Thuróczy, O. Sági, **B. G. Márkus**, F. Simon, I. Nándori: **Polarized superlocalization in magnetic nanoparticle hyperthermia**, *Journal of Physics D: Applied Physics* **55**, 205001 (2022).
- 29 2022 S. Kollarics, F. Simon, A. Bojtó, K. Koltai, G. Klujber, M. Szieberth, **B. G. Márkus**, D. Beke, K. Kamarás, A. Gali, D. Amirari, R. Berry, S. Boucher, D. Gavryushkin, G. Jeschke, J. P. Cleveland, S. Takahashi, P. Szirmai, L. Forró, E. Emmanouilidou, R. Singh, K. Holczér: **Ultrahigh nitrogen-vacancy center concentration in diamond**, *Carbon* **188**, 393-400 (2022).
- 30 2021 D. Beke, M. V. Nardi, G. Bortel, M. Timpel, Zs. Czigány, L. Pasquali, A. Chiappini, G. Bais, M. Rudolf, D. Zalka, F. Bigi, F. Rossi, L. Bencs, A. Pekker, **B. G. Márkus**, G. Salviati, S. E. Sadow, K. Kamarás, F. Simon, A. Gali: **Enhancement of X-ray-Excited Red Luminescence of Chromium-Doped Zinc Gallate via Ultrasmall Silicon Carbide Nanocrystals**, *Chemistry of Materials* **33**(7), 2457-2465 (2021).
- 31 2021 I. Gresits, Gy. Thuróczy, O. Sági, S. Kollarics, G. Csősz, **B. G. Márkus**, N. M. Nemes, M. García Hernández, F. Simon: **Non-exponential magnetic relaxation in magnetic nanoparticles for hyperthermia**, *Journal of Magnetism and Magnetic Materials* **526**, 167682 (2021).
- 32 2021 A. Mitrović, S. Wild, V. Lloret, M. Fickert, M. Assebban, **B. G. Márkus**, F. Simon, F. Hauke, G. Abellán, A. Hirsch: **Interface amorphization of two-dimensional black phosphorus upon the treatment with diazonium salts**, *Chemistry - A European Journal* **27**, 3361-3366 (2021).
- 33 2020 J. Gainza, F. Serrano-Sánchez, J. E. F. S. Rodrigues, Y. Huttel, O. J. Dura, M. M. Koza, M. T. Fernández-Díaz, J. J. Meléndez, **B. G. Márkus**, F. Simon, J. L. Martínez, J. A. Alonso, N. M. Nemes: **High-performance n-type SnSe thermoelectric polycrystal prepared by arc-melting**, *Cell Reports Physical Science* **1**(12), 100263 (2020).
- 34 2020 **B. G. Márkus**, O. Sági, S. Kollarics, K. F. Edelthammer, A. Hirsch, F. Hauke, P. Szirmai, B. Náfrádi, L. Forró, F. Simon: **Tuning Conductivity and Spin Dynamics in Few-Layer Graphene via In Situ Potassium Exposure**, *Physica Status Solidi B* **257**(12), 2000368 (2020).
- 35 2020 S. Kollarics, A. Bojtó, K. Koltai, **B. G. Márkus**, K. Holczér, J. Volk, G. Klujber, M. Szieberth, F. Simon: **Optical-Microwave Pump-Probe Studies of Electronic Properties in Novel Materials**, *Physica Status Solidi B* **257**(12), 2000298 (2020).
- 36 2020 **B. G. Márkus**, P. Szirmai, K. F. Edelthammer, P. Eckerlein, A. Hirsch, F. Hauke, N. M. Nemes, Julio C. Chacón-Torres, B. Náfrádi, L. Forró, T. Pichler, F. Simon: **Ultralong Spin Lifetime in Light Alkali Atom Doped Graphene**, *ACS Nano* **14**(6), 7492-7501 (2020).
- 37 2020 D. Beke, J. Valenta, G. Károlyházy, S. Lenk, Z. Czigany, **B. G. Márkus**, K. Kamarás, F. Simon, A. Gali: **Room Temperature Defect Qubits in Ultrasmall Nanocrystals**, *The Journal of Physical Chemistry Letters* **11**, 1675-1681 (2020).
- 38 2020 J. A. Carrasco, A. Seijas-Da Silva, V. Oestreich, J. Romero, **B. G. Márkus**, F. Simon, B. J. C. Vieira, J. C. Waerenborgh, G. Abellán, E. Coronado: **Fundamental Insights into the Covalent Silane Functionalization of NiFe-Layered Double Hydroxides**, *Chemistry - A European Journal* **26**(29), 6504-6517 (2020).
- 39 2020 M. Tejada-Serrano, V. Lloret, **B. G. Márkus**, F. Simon, F. Hauke, A. Hirsch, A. Doménech-Carbó, G. Abellán, A. Leyva-Pérez: **Few-layer black phosphorus catalyses radical additions to alkenes faster than low-valence metals**, *ChemCatChem* **12**(8), 2226-2232 (2020).
- 40 2019 B. Gyüre-Garami, B. Blum, O. Sági, A. Bojtó, S. Kollarics, G. Csősz, **B. G. Márkus**, J. Volk, F. Simon: **Ultrafast sensing of photoconductivity decay using microwave resonators**, *Journal of Applied Physics* **126**(23), 235702 (2019).

- 41 2019 P. Szirmai, **B. G. Márkus**, J. C. Chacón-Torres, P. Eckerlein, K. Edelthammer, J. M. Englert, U. Mundloch, A. Hirsch, F. Hauke, B. Náfrádi, L. Forró, C. Kramberger, T. Pichler, F. Simon: **Characterizing the maximum number of layers in chemically exfoliated graphene**, *Scientific Reports* **9**, 19480 (2019). Equal contribution with the first author.
- 42 2019 S. Kollarics, J. Palotás, A. Bojtó, **B. G. Márkus**, P. Rohringer, T. Pichler, F. Simon: **Improved laser based photoluminescence on single-walled carbon nanotubes**, *Physica Status Solidi B* **256**(12), 1900235 (2019).
- 43 2019 **B. G. Márkus**, P. Szirmai, S. Kollarics, B. Náfrádi, L. Forró, J. C. Chacón-Torres, T. Pichler, F. Simon: **Improved alkali intercalation of carbonaceous materials in ammonia solution**, *Physica Status Solidi B* **256**(12), 1900324 (2019).
- 44 2019 F. Márkus, **B. G. Márkus**: **Enhanced Electron Scattering upon Ion Relocation in BaVS₃ at 69 K**, *Entropy* **21**(8), 813 (2019).
- 45 2019 I. Gresits, Gy. Thuróczy, O. Sági, I. Homolya, G. Bagaméry, D. Gajári, M. Babos, P. Major, **B. G. Márkus**, F. Simon: **A highly accurate determination of absorbed power during magnetic hyperthermia**, *Journal of Physics D: Applied Physics* **52**(37), 375401 (2019).
- 46 2018 **B. G. Márkus**, B. Gyüre-Garami, O. Sági G. Csősz, A. Karsa, F. Márkus, F. Simon: **Heating Causes Non-linear Microwave Absorption Anomaly in Single-Walled Carbon Nanotubes**, *Physica Status Solidi B* **255**(12), 1800258 (2018).
- 47 2018 **B. G. Márkus**, G. Csősz, O. Sági, B. Gyüre-Garami, V. Lloret, S. Wild, G. Abellán, N. M. Nemes, G. Klupp, K. Kamarás, A. Hirsch, F. Hauke, F. Simon: **Electronic Properties of Air-Sensitive Nanomaterials Probed with Microwave Impedance Measurements**, *Physica Status Solidi B* **255**(12), 1800250 (2018).
- 48 2018 B. Gyüre-Garami, O. Sági, **B. G. Márkus**, F. Simon: **A highly accurate measurement of resonator Q-factor and resonance frequency**, *Review of Scientific Instruments* **89**, 113903 (2018).
- 49 2018 I. Gresits, Gy. Thuróczy, O. Sági, B. Gyüre-Garami, **B. G. Márkus**, F. Simon: **Non-calorimetric determination of absorbed power during magnetic nanoparticle based hyperthermia**, *Scientific Reports* **8**, 12667 (2018).
- 50 2018 G. Csősz, **B. G. Márkus**, A. Jánosy, N. M. Nemes, F. Murányi, G. Klupp, K. Kamarás, V. G. Kogan, S. L. Bud'ko, P. C. Canfield, F. Simon: **Giant microwave absorption in fine powders of superconductors**, *Scientific Reports* **8**, 11480 (2018).
- 51 2017 **B. G. Márkus**, F. Simon, K. Nagy, T. Fehér, S. Wild, G. Abellán, J. C. Chacón-Torres, A. Hirsch, F. Hauke: **Electronic and Magnetic Properties of Black Phosphorus**, *Physica Status Solidi B* **254**(14), 1700232 (2017).
- 52 2017 P. Szirmai, **B. G. Márkus**, B. Dóra, G. Fábián, J. Koltai, V. Zólyomi, J. Kürti, B. Náfrádi, L. Forró, T. Pichler, F. Simon: **Doped carbon nanotubes as a model system of biased graphene**, *Physical Review B*, **96**, 075133 (2017). Equal contribution with the first author.
- 53 2016 **B. G. Márkus**, L. Szolnoki, D. Iván, B. Dóra, P. Szirmai, B. Náfrádi, L. Forró, F. Simon: **Anisotropic Elliott–Yafet theory and application to KC₈ potassium intercalated graphite**, *Physica Status Solidi B* **253**(12), 2505-2508 (2016).
- 54 2016 D. Quintavalle, **B. G. Márkus**, A. Jánosy, F. Simon, G. Klupp, M. A. Györi, K. Kamarás, G. Magnani, D. Pontiroli, and M. Riccò: **Electronic and ionic conductivities in superionic Li₄C₆₀**, *Physical Review B*, **93**, 205103 (2016).
- 55 2016 **B. G. Márkus**, F. Márkus: **Quantum Particle Motion in Absorbing Harmonic Trap**, *Indian Journal of Physics*, **90**, 4, 441-446 (2016).
- 56 2015 **B. G. Márkus**, F. Simon, J. C. Chacón-Torres, S. Reich, P. Szirmai, B. Náfrádi, L. Forró, T. Pichler, P. Vecera, F. Hauke, A. Hirsch: **Transport, Magnetic and Vibrational Properties of Chemically Exfoliated Few Layer Graphene**, *Physica Status Solidi B*, **52296** (2015).

- 57 2015 B. Gyüre, **B. G. Márkus**, B. Bernáth, F. Murányi, F. Simon: **A time domain based method for the accurate measurement of Q -factor and resonance frequency of microwave resonators**, *Review of Scientific Instruments* **86**, 094702 (2015).
- 58 2013 S. Giura, **B. G. Márkus**, S. H. L. Klapp, M. Schoen: **Isotropic-polar phase transitions in an amphiphilic fluid: Density functional theory versus computer simulations**, *Physical Review E* **87**, 012313 (2013).

PATENTS

D. Beke, **B. G. Márkus**, L. Forró: “Methods and Apparatus for Preparing High-Karat Gold in Various Colors” $\diamond$ U.S. Patent Application No. 19/495,637, filed 12/19/2025. Pending.

PRESENTATIONS

- 2026 **B. G. Márkus**: Unprecedented Spin-Lifetime of Itinerant Electrons in Natural Graphite Crystals, *APS Global Physics Summit 2026 MAR-S39*, contributed talk (March 16-20, 2026).
- 2026 **B. G. Márkus**: *Graphitronics: Road to Room-Temperature Spin Devices*, University of Alabama-Birmingham, Department of Physics, colloquium talk (February 6, 2026).
- 2024 **B. G. Márkus**: Band Degeneracy Leads to Anomalous Spin-Dynamics in Graphite, *2024 Trends in Quantum Matter Controlling Low-dimensional Quantum System: A Confluence of Theory and Experiment*, contributed talk (October 19-20, 2024).
- 2024 *Invited talk.* **B. G. Márkus**, L. Forró, J. Fabian, F. Simon: Ultralong 100 ns spin relaxation time in graphite at room temperature, *From Solid-State to Biophysics XI*, (June 8-15, 2024).
- 2023 **B. G. Márkus**, M. Gmitra, B. Dóra, G. Csősz, T. Fehér, P. Szirmai, B. Náfrádi, V. Zólyomi, L. Forró, J. Fabian, F. Simon: Ultralong 100 ns Spin Relaxation Time in Graphite at Room Temperature, *APS March Meeting 2023 T00.233*, conference poster (March 5-10, 2023).
- 2023 D. Beke, A. Gali, M. Rudolf, **B. G. Márkus**: Microstructure-Dependent Optical Properties of Doped Spinel Oxide Nanosystems, *APS March Meeting 2023 T44.1*, conference poster (March 5-10, 2023).
- 2020 **B. G. Márkus**, P. Szirmai, K. Edelthammer, P. Eckerlein, A. Hirsch, F. Hauke, N. M. Nemes, J. C. Chacón-Torres, B. Náfrádi, T. Pichler, L. Forró, F. Simon: Ultralong spin lifetime in graphene doped with light alkali metals, *IWEPNM 2020*, conference poster (March 7-14, 2020).
- 2019 *Invited talk.* **B. G. Márkus**, M. Gmitra, B. Dóra, G. Csősz, T. Fehér, A. Jánossy, P. Szirmai, B. Náfrádi, L. Forró, V. Zólyomi, J. Fabian, F. Simon: Giant spin-relaxation anisotropy in graphite, *1st Contemporary Condensed Matter Physics Challenges*, (May 9, 2019).
- 2019 **B. G. Márkus**, P. Szirmai, J. C. Chacón-Torres, P. Eckerlein, K. Edelthammer, J. M. Englert, U. Mundloch, A. Hirsch, F. Hauke, B. Náfrádi, L. Forró, C. Kramberger, T. Pichler, F. Simon: Resolving the number of layers in chemically exfoliated graphene, *IWEPNM 2019*, conference poster (March 9-16, 2019).
- 2018 F. Márkus, **B. G. Márkus**: On the specific heat of BaVS_3 at 69 K, *MECO43 2018*, conference poster (May 1-4, 2018).
- 2018 **B. G. Márkus**, O. Sági, B. Gyüre-Garami, A. Garami, B. Dóra, F. Simon, V. Lloret, S. Wild, G. Abellán, A. Hirsch, F. Hauke: Magnetic and electronic properties of alkali-doped black phosphorus probed by NMR, ESR and microwave spectroscopy, *IWEPNM 2018*, conference poster (March 17-24, 2018).
- 2017 **B. G. Márkus**, F. Márkus: Complex potentials in the description of dissipation, *JETC 2017*, conference poster (May 21-25, 2017).
- 2017 **B. G. Márkus**, B. Gyüre, A. Garami, B. Dóra, S. Wild, G. Abellán, F. Hauke, A. Hirsch, F. Simon: Electronic properties of pristine and alkali-doped black phosphorus, *IWEPNM 2017*, conference poster (March 8-15, 2017).
- 2016 **B. G. Márkus**, D. Iván, L. Szolnoki, B. Dóra, P. Szirmai, B. Náfrádi, L. Forró, F. Simon: Anisotropic Spin Relaxation in Graphite Intercalated Compounds, *17th International Conference on the Science and Application of Nanotubes and Low-Dimensional Materials - NT16*, conference poster (August 7-13, 2016).

- 2016 **B. G. Márkus**, D. Iván, L. Szolnoki, B. Dóra, P. Szirmai, B. Náfrádi, L. Forró, F. Simon: Anisotropic Spin Relaxation in Graphite Intercalated Compounds, *IWEPNM 2016*, conference poster (February 13-20, 2016).
- 2016 J. Chacón, B. Hatting, S. Heeg, **B. G. Márkus**, F. Simon, C. Berger, A. Vijayaraghavan, S. Reich: Vibrational response of graphene in the highly-doped regime, *IWEPNM 2016*, conference poster (February 13-20, 2016).
- 2015 J. C. Chacón-Torres, B. Hatting, S. Heeg, C. Berger, C. Woods, **B. G. Márkus**, F. Simon, A. Vijayaraghavan, S. Reich: Optical properties of highly doped graphene, *Graphene Week 2015*, conference poster (June 22-26, 2015).
- 2015 **B. G. Márkus**, F. Márkus: Quantum Particle Motion in Absorbing Harmonic Trap, *MECO40*, conference poster (March 23-25, 2015).
- 2015 **B. G. Márkus**, P. Szirmai, J. C. Chacón-Torres, P. Vecera, F. Hauke, A. Hirsch, J. M. Englert, T. Pichler, L. Forró, S. Reich, F. Simon: Synthesis and Electronic Properties of Li-doped Chemically Exfoliated Graphene, *IWEPNM 2015*, conference poster (March 7-14, 2015).
- 2014 **B. G. Márkus**, P. Szirmai, T. Pichler, F. Simon: Lithium doped Single-walled carbon nanotubes, *18th Conference of Czech and Slovak Physicists*, conference poster (September 16-19, 2014).

RESEARCH FUNDING AND GRANT PARTICIPATION

National Research, Development and Innovation Office of Hungary Grant: *Spin and charge dynamics phenomena in novel materials*, “137852” 2021-2025

Role: Co-I. PI: Prof. Ferenc Simon

Total award: 48M HUF (\$158k)

National Research, Development and Innovation Office of Hungary Grant: *Molecular and genomic investigation of the mutagenic effect of alcohol consumption*, “134779” 2020-2024

Role: Co-I. PI: Prof. Dávid Szüts

Total award: 48M HUF (\$155k)

National Research, Development and Innovation Office of Hungary Grant: *Interaction, topology and dynamics in exotic quantum systems*, “119442” 2016-2021

Role: Co-I. PI: Prof. Balázs Dóra

Total award: 48M HUF (\$170k)

Momentum Grant: *Spin and charge dynamics in strongly correlated systems*, Hungarian Academy of Sciences, “PROSPIN” 2015-2019

Role: Co-I. PI: Prof. Ferenc Simon

Total award: 200M HUF (\$660k)

ERC Starting Grant: *Spin dynamics and transport at the quantum edge in low dimensional nanomaterials*, European Research Council, “SYLO” 2010-2014

Role: Co-I. PI: Prof. Ferenc Simon

Total award: €1M (\$1.3M)

HONORS AND AWARDS

Győző Zemplén Young Researcher Award	2018
BMe Research Competition ◇ 2 nd prize	2016
National Higher Education Scholarship	2014

TEACHING EXPERIENCE

Condensed Matter Physics (graduate)	Notre Dame	Spring 2025
Concepts of Energy and Environment (undergrad)	Notre Dame	Spring 2023
Experimental Physics III. (thermo, stat. mech., intro modern phys.)	BME	Fall 2015-2018
Physics Laboratory II.	BME	Fall 2015-2016
Physics Laboratory I.	BME	Spring 2016
Introductory Physics for Electrical Engineers	BME	Fall 2014

MENTORING EXPERIENCE

Undergraduate Scientific Research Mentor	Fall 2025
<i>Gergely Czehlár: Tailoring the electronic properties of transition metal dichalcogenides towards superconductivity</i>	2 nd prize
Undergraduate Scientific Research Mentor	Fall 2025
<i>Sándor H. Sipos: Tuning the Magnetic Properties of Rare-Earth Doped MXenes for Spintronic Applications</i> (in Hungarian)	outstanding research prize
NDnano Summer Undergraduate Research Mentor	Summer 2025
<i>Sándor H. Sipos: Tailoring the magnetic properties of MXenes</i>	
NDnano Summer Undergraduate Research Mentor	Summer 2025
<i>Gergely Czehlár: Pursuing superconductivity in doped transition metal dichalcogenides</i>	
Bachelor of Science in Physics Supervisor	Fall 2024-Spring 2025
<i>Kitti P. Soós: Magnetic Properties of Novel Low-Dimensional Materials</i> (in Hungarian)	
NDnano Summer Undergraduate Research Mentor	Summer 2024
<i>Kitti P. Soós: Tailoring the electronic/magnetic properties of MXenes</i>	
NDnano Summer Undergraduate Research Mentor	Summer 2024
<i>Gergő O. Németh: Pursuing superconductivity in doped transition metal dichalcogenides</i>	
Undergraduate Scientific Research Mentor	Fall 2023
<i>Lili Vajtai: Pursuing superconductivity in novel low-dimensional materials</i> (in Hungarian)	1 st prize ◇ Dennis Gabor prize
NDnano Summer Undergraduate Research Mentor	Summer 2023
<i>Lili Vajtai: Pursuing superconductivity in novel low-dimensional materials</i> (now Ph.D. student at the University of Notre Dame)	
NDnano Summer Undergraduate Research Mentor	Summer 2023
<i>Robin J. Kucsera: Tailoring the electronic properties of Ti-based MXenes</i>	
Undergraduate Scientific Research Mentor	Summer 2021-Fall 2021
<i>Róbert A. Magyar: Investigation of Sodium-Doped Single-Walled Carbon Nanotubes</i> (in Hungarian)	outstanding research prize

ACADEMIC SERVICE & PROFESSIONAL ASSOCIATIONS

Peer reviewer for the following journals:

Physical Review X [1×] ◇ Physical Review Letters [1×] ◇ Nanomaterials [2×] ◇ Physical Review B [5×] ◇ Physical Review Materials [4×] ◇ Energies [1×] ◇ Surfaces [1×] ◇ Journal of Applied Physics [1×] ◇ Physica Status Solidi (B) [1×]

2025-2026 Member of the American Physical Society (APS)
 2025-2026 Member of the American Chemical Society (ACS)
 2024-2025 Member of the American Association for the Advancement of Science (AAAS) – Program for Excellence in Science
 2023-2024 Member of the NDnano Graduate Student and Postdoc Leadership Group
 2022-2026 Notre Dame COS-JAM Undergraduate Research Judge
 2022-2023 Member of the American Physical Society (APS)

PROFESSIONAL EXPERIENCE

Visiting Scholar	October-December 2020
Department of Physics, EPFL - Swiss Federal Technology Institute of Lausanne, Lausanne, Switzerland	
Host: Prof. László Forró	
Visiting Researcher	June-July 2020
Department of Physics, EPFL - Swiss Federal Technology Institute of Lausanne, Lausanne, Switzerland	
Host: Prof. László Forró	
Visiting Researcher	June-July 2018
Max Planck Institute for Chemical Physics of Solids (CPfS), Dresden, Germany	
Host: Dr. Michael Baenitz	
Visiting Researcher	December 2018
Electronic Properties of Materials, University of Vienna, Vienna, Austria	
Host: Prof. Thomas Pichler	
Visiting Researcher	June-July 2017
Center of Advanced Materials and Processes (ZMP), University of Erlangen-Nuremberg, Fürth-Erlangen, Germany	
Host: Dr. Frank Hauke	
Summer Graduate Researcher	June-July 2016
Department of Physics, EPFL - Swiss Federal Technology Institute of Lausanne, Lausanne, Switzerland	
Host: Prof. László Forró	
Summer Graduate Researcher	June-July 2015
Department of Physics, EPFL - Swiss Federal Technology Institute of Lausanne, Lausanne, Switzerland	
Host: Prof. László Forró	
Summer Graduate Researcher	March 2015
Department of Physics, Freie Universität Berlin, Berlin, Germany	
Host: Prof. Stephanie Reich	

Summer Research Fellow

June-July 2014

Electronic Properties of Materials, University of Vienna, Vienna, Austria

Host: Prof. Thomas Pichler

Summer Research Intern

July 2012

Department of Physical and Theoretical Chemistry, Technische Universität Berlin, Berlin, Germany

Host: Prof. Martin Schoen

Summer Research Intern

June 2012

Department of Physics, Budapest University of Technology and Economics, Budapest, Hungary

Host: Prof. Ferenc Simon

EXPERIMENTAL AND TECHNICAL SKILLS

- Synthesis of single-crystalline and nanomaterials by chemical vapor transport, vacuum sublimation, flux growth, hydrothermal reaction, and wet chemical techniques
- Magnetic resonance techniques: electron spin resonance (ESR/EPR), high-frequency electron spin resonance (HF-ESR/VHF-EPR), light-induced ESR (LESR), optically detected magnetic resonance (ODMR), liquid and solid-state nuclear magnetic resonance (NMR), nuclear quadrupole resonance (NQR)
- Optical spectroscopy: Raman, FT-IR, Photoluminescence (PL), UV-Vis
- Transport techniques: Resistivity, Magnetoresistance, Hall effect, photoconductivity, RF-impedance spectroscopy, microwave conductivity
- Expertise with dilution refrigerators
- Low and high-temperature magnetic properties measurements: superconducting quantum interference device (SQUID), vibrating sample magnetometry (VSM), AC susceptibility (ACMS)
- Heat capacity (HC), differential scanning calorimetry (DSC), thermogravimetric analysis (TGA), and mass spectroscopy (MS)
- X-ray diffraction and refinement
- Scanning and transmission electron microscopy (SEM, TEM), selected area electron diffraction (SAED)
- X-ray Photoelectron Spectroscopy (XPS), X-ray fluorescence (XRF), Energy-dispersive X-ray spectroscopy (EDX)
- Atomic force microscopy (AFM), optical profilometry, BET porosity analysis
- Handling of cryogenic liquids and solids
- Quartz tube sealing under vacuum and in atmosphere

LANGUAGES

English	Fluent
Hungarian	Native
German	Conversational
French	Basic

REFERENCES

Prof. László Forró (Postdoc supervisor)

Marquez Chair Professor of Physics and Director of Stavropoulos Center for Complex Quantum Matter

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Professor, Vice Dean

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Associate Professor

Department of Physics & Astronomy, University of Notre Dame

+1 (574) 631-1518, nghimire@nd.edu

Prof. Norbert M. Nemes

Professor

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