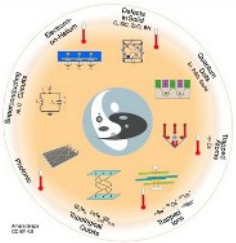

Amara Lynn Graps

"Quantum Progress"

1) Quantum Progress

Quantum Progress aims to help the quantum tech community reduce the hype and increase the understanding. After the science, I find the human stories and the *business lessons* where the industry+research community can learn from each other and grow. Yes, I can clarify the complex AI-Quantum-HPC domain for Deep Tech!

2025: October 1- 2026 January. FirstQFM Partnerships

Support and Promotion of FirstQFM just emerging from stealth. Two Hack-a-thon mentor panels: 1) Nov 8, 2025 India (remote) "Qiskit Hackathon", 2) Nov 14, 2025 Lithuania "Quantum Boost" (Vilnius), Built a detailed Communication Strategy, first rung of Credibility Ladder, EU Quantum Act 'Answer', EU Quantum Funding support, Engaged Hardware Vendors. Long form analysis pieces: 1) Error Correction and the Final Frontier, 2) GHZ States (Part 1, Part 2, Part 3), 3) Peaked Circuits (Part 1, Part 2 (edited)) (full article in Google drive)

2025 May European Commission EIC Quantum Technology Evaluator

Six Expert EIC proposal evaluations for a total of 25 MEuros

2025: January 1- present Quantum Security Defense

Support and Promotion of Quantum Security and Defense Association. My own contributions: 1) May 2025 ***Quantum Ecosystems 101***, a 2-hr course for building a vendor's quantum ecosystem of users plus QSECDEF Blog, plus QSECDEF Free Audiobook, 2) tracking for Eastern Flank Drones Development, 3) Intelligence on Russia+Europe Society Resilience: Hybrid War Tracker project Handbook, Google Spreadsheet, Data is also JSON format inside volunteer team's OSINT (beta) platform https://hwt.lv

2025: January 15- present. HKA Marketing

Press Releases, Pitches, Quantum (AI and Space) Stories short form for quantum PR firm. Freelance.

2024: 50 article blitz (2.3 month: August 20-November 9) Global Quantum Intelligence

Quantum technology investigations for a deep tech audience, with storylines that followed a human conundrum, which included an infusion of GQI insight for the Quantum Computing Report. These stories were a bridge from the large GQI product (1000s of pages of business intelligence), which is behind a virtual wall, to the community. The stories were designed to build the GQI brand and build an ecosystem. The quantum stories are original research but written to meet an aggressive (20/month) publication schedule. The work included error correction of the client materials, and social media posting. I found my **story nuggets** this way. See also a Summer 2025, 227-page compilation: A QuantumTechnology Blitz Hot Summer Reading. Links go to archived versions.

- 1. QCR: The Many Faces of Hybrid Classical-Quantum Computing- Part 1: Basics and Cloud Vendors
- 2. QCR: The Many Faces of Hybrid Classical-Quantum Computing- Part 2: Colocation, High Performance Computers, and Co-Design
- 3. QCR: The Many Faces of Hybrid Classical-Quantum Computing- Part 3: The Primary Algorithms VQA, VQE and QAOA
- 4. QCR: Australia's Quantum Ecosystem Meets Export Control: Opportunities with Missteps: Part 1: Export Control
- 5. QCR: Australia's Quantum Ecosystem Meets Export Control: Opportunities with Missteps – Part 2: Australia's Quantum Ecosystem
- 6. QCR: Quantum Technology Use Cases for Health
- 7. QCR: Quantum Technology Cancer Use Cases
- 8. QCR: Quantum Technology Algorithm Trends- Tidying Up
- 9. QCR: Quantum Technology Algorithms- The Ansatz Zoo
- 10. QCR: Ingredients for a Quantum Killer App

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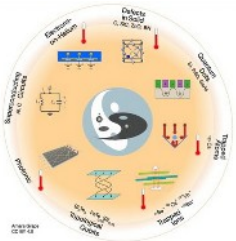

Amara Lynn Graps

"Quantum Progress"

- 11. QCR: Quantum Communication- Different Visions of the Quantum Internet
- 12. QCR: Quantum Communication- Large Activity but Small Investments
- 13. QCR: China's Quantum Technology Strengths- More than Quantum Communication
- 14. QCR: European Patents- When Global Becomes Local
- 15. QCR: How Confident are the French and Germans in their Country's Quantum Competitiveness?
- 16. QCR: German Ecosystem Part 1: Quantum Processor Development
- 17. QCR: German Ecosystem Part 2: Investments, Patents, and PESTEL
- 18. QCR: GQI's Quantum Ecosystem Assessment: the PESTEL Perspective
- 19. QCR: The European Quantum Communication Infrastructure
- 20. QCR: Helium-3 in the Quantum Technology Supply Chain
- 21. QCR: Critical Electronics in the Quantum Technology Supply Chain
- 22. QCR: The Pervasiveness of Machine Learning in Quantum Technology
- 23. QCR: Machine Learning for Semiconductor Spin Qubits
- 24. QCR: AI for Quantum / Quantum for AI: EU Foresight
- 25. QCR: Quantum for AI: Weather Forecasting. Are we There Yet?
- 26. QCR: Quantum Sensors: Atom Interferometry. Part 1: Basics
- 27. QCR: Quantum Sensors: Atom Interferometry. Part 2: Nobel Prize connections
- 28. QCR: Quantum Sensors: Atom Interferometry. Part 3: Space is the Place
- 29. QCR: Quantum Sensors: What's Going on with Investments?
- 30. QCR: Quantum Algorithms for Solving Differential Equations
- 31. QCR: Quantum Computational Fluid Dynamics (QCFD)- Part 1: the Literature
- 32. QCR: Quantum Computational Fluid Dynamics (QCFD)- Part 2: Use Cases: Rolls-Royce and BosonQ PSI
- 33. QCR: Quantum Computational Fluid Dynamics (QCFD)- Part 3: Use Case: Lattice Boltzmann and Quanscient
- 34. QCR: NATO's Quantum-Safe Future Transition
- 35. QCR: NATO in the Quantum Industry Accelerator Business
- 36. QCR: Quantum for AI: Costs from a Diagnostic Benchmark
- 37. QCR: Diagnostic Benchmarks for Quantum Computing
- 38. QCR: Recipe for a Quantum Hype Omelet
- 39. QCR: Diagnostic Benchmarks for Hybrid Quantum Computing
- 40. QCR: The Power of XOR
- 41. QCR: The Little QKD Satellite That Could
- 42. QCR: The Canadian Quantum Ecosystem
- 43. QCR: Quantum Biology: Part 1: Nature-made quantum sensors
- 44. QCR: Quantum Biology: Part 2: Photosynthesis
- 45. QCR: Quantum Communication From Sea to Sea
- 46. QCR: The Low-Hanging Fruit of Experience
- 47. QCR: Quantum Memory: A Tale of Three Patents. Part 1, Diversification
- 48. QCR: Quantum Memory: A Tale of Three Patents. Part 2: The "Art"

Continued at LinkedIn. More polished.

- 49. LI: Can FORTRAN Point the Way to Useful Quantum Applications?

The next styles are different, which used a "Present Worry then Solution" to build a story and keep readers on the page. The audience would be in particular the Big Players and the Managers with funding decisions.

- 50. LI: Your Limited Time for Dual-Use Quantum Sensors

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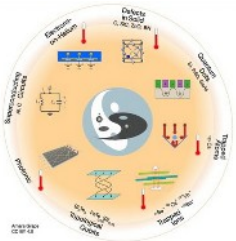

Amara Lynn Graps

"Quantum Progress"

The next battery article was deeply researched and utilized my large research materials about NetZero strategies for Climate Change, but in quantum computing, a specialty that followed from my ELLF climate change, citizen science cubesat project and WEF data mining for a quantum computing company.

- 51. LI: The Electric Battery-Quantum Computing Conundrum

China. It has been a year since the last complete report in 2023 on Chinese activities; the country movies fast. Two China quantum articles: one on a fast-moving vector with China Telecom Quantum Group and another that tells a business and human story from the Chinese patent records from the mid 2010s.

- 52. Patent Story: The Scandal that could have Broken the Chinese Quantum Technology Industry and Didn't
- 53. The Fast Rise of the China Telecom Quantum Group

AI for Quantum. Quantum for AI. The Overlap between Quantum and AI is broader and deeper. This article pulls togther writings from QCR in the Fall 2024. Since I wrote this, I now believe that there is more progress for the Quantum for AI, and I believe that two sides are equally impressive in their progress.

- 54. The Dependencies of AI for Quantum

Enter the Measurement-Based Quantum Computer The current annealing or gate-based method of quantum computing is not the only possible architecture for quantum computing, there is another, sometimes called a "One-Way Quantum Computer". This article provides an introduction to that architecture with a lesson at the end for Why quantum companies should be engaging the Deep Tech community more.

- 55. Enter the Measurement-Based Quantum Computer

Earlier, Polished Articles: 2021-2023

- Quantum Technology **Modalities**
  - **Superconducting Quantum Computers:** IQM on the Fidelity and Useability Path for Quantum Computing. (IQM Report- six months inside the company January-July 2023)
    To Scale? Foundries article below.
  - **Superconducting Quantum Computers:** Today's and Tomorrow's Qubit (google drive)
  - **NV in Diamond Quantum Technology** Quantum diamond deficits and assets (archived) To Scale? *The more turnkey is the desired doping, isotopic purity and dimensions of CVD-grown diamond films and crystals, the less time needed to scale.*
  - **Ion Trap Quantum Technology** From Perfect Qubit to Goldilocks Qubit for Ion Traps (archived) To Scale? *The fewer the number of required lasers, the less time needed to scale.*
  - **Photonic Quantum Computing** Photonic Quantum Computing Advances Squeezed Light (archived) To Scale? *The more multiplexing loops, the less time needed to scale.*
- Quantum Technology **Use Cases**
  - **Quantum Drones** Quantum Drones - Better than Owls (archived)
  - **Quantum Satellites** Quantum Satellite Internet- We need you (archived)
  - **Post-Quantum Cryptography** Quantum Cryptographic Threat Timeline (archived)
  - **Quantum Magnetometers 3 Use Cases** Navigating Quantum Realms (archived)
- **Easiest** Quantum to Implement
  - **Quantum Key Distribution** QKD as the Most Likely Quantum Technology to be Adopted in the Short-Term (archived)
- **Necessary** Quantum Computing Functionality
  - **Quantum Error Correction** QEC is correcting better to record low rates (archived)
  - **Benchmarking:** Benchmarking for Quantum Tech Viability and Growth (google drive)
  - **Foundries:** Foundries for Superconducting Quantum Computers (google drive)

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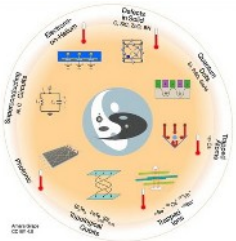

AMARA LYNN GRAPS

"QUANTUM PROGRESS"

- **Quantum Annealing Optimization Ecosystem**
  - IQT: **The Value of Being a Quantum Optimization Agnostic**, Parts 1 and 2. (both at google drive)
  - QCR: **The Quantum Optimization Landscape: From Quantum Annealers to Probabilistic Computers** (Double-sized, QCR, both at google drive)
  - In 2021-23 word count, 1/3 of my quantum tech writing-analysis covers the lessons of the first quantum computing company and its decade-long quantum annealing ecosystem development towards the best and fastest optimization strategies. Articles show deep-tech analysis, international inclusion, business lessons, human stories, connecting writing style and research. Can provide!
- **Hybrid Classical-Computing: 500 Hybrid Quantum-Classical Articles for the Win**
  - 60K word Report for IQT emphasizing Use Cases, which was transformed into a personal one-year project, *ongoing*, due to this *very active* subfield. The keywords to find these go way beyond 'hybrid' and the quantum algorithm primitives are beginning to point to preferred modalities. See my summary at Linked In, and various writings at Quantum Computing Report (above) and my Article that pulls together NISQ Reviews and Summaries.
- **Chinese Quantum Ecosystem**
  - **Funding+Government Policy+Education** (Double-sized, QCR, both at google drive)
  - **People + Places + Companies + Patents** (Double-sized, QCR, both at google drive)
  - In 2021-23 count, one-third of my quantum tech writing-analysis covers the **China quantum ecosystem**. I used open sources: Patents, social media, blogs, gov't press, accounting reports, satellite maps, … Article shows open source research critical thinking, international inclusion, business lessons, human stories, society gender inclusion (or not) connecting writing style and research. Happy to provide upon request.

Other Quantum Technology Activities

2) **Quantum Computing / NetZero Strategy** for a Superconducting Quantum Computing company, IQM. Jan-June 2023.
3) **Conference Session Moderation.** Moderated a Quantum Technology Session at RigaCOMM, October 2023
4) **Quantum Technology 101** *A Three-Day Quantum Tech Course* for Startup Founders (Baltic Sandbox Ventures). November 2023
5) **Quantum Business Opportunities. A** *45min Presentation to Lithuanian Academics and members from the Lithuanian Ministry of Economy*. June 2024
6) **Quantum Companies Due Diligence.** European Investment Council. 2023. Baltic Sandbox December 2024.
7) **2025 Year of Quantum: Word Clouds Art** for Entities to Celebrate this year, filling the numbers with True Keywords from the Entities' research papers.
8) **NISQ Review Papers** *53 Survey Papers***.** A Noisy Intermediate Scale Quantum Bibliography List with Evaluations and Citations. October 2025

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Amara Lynn Graps

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Born: March 28, 1961, Honolulu, Hawaii, U.S.A.
Citizenship (dual): Latvia (Grapa), U.S.A. (Graps)
Child: Vija Alexandra Graps (Grapa), born 2 January 2009.
ORCID: https://orcid.org/0000-0003-1758-2943

Education

- Ph.D. Physics University of Heidelberg (Germany), July 2001. Thesis title: *Io Revealed in the Jovian Dust Streams.* (rated: Magna Cum Laude)
- M.S. Physics San Jose State University, California (USA), August 1991. Thesis title: *Investigating the Motions and Energies of Ions Confined in a Uniform Magnetic Field.*
- B.S. Physics University of California, Irvine (USA), June 1984.

Employment/Experience

Amara Graps, (PhD Physics University of Heidelberg, 2001, Asteroid: (9027) Graps), winner of the 2018 Europlanet Public Engagement Prize, was working professionally in the international astronomy, astrophysics, and planetary science research field from **1981-2021**. Then I pivoted.

NEW: In Fall 2021, I put my interdisciplinary physicist skills to work *analyzing quantum technology*. I started a service: **Quantum Progress**, for news orgs (IQT, QCR) and investors (Baltic Sandbox Ventures) and computer companies with a focus on deep tech audiences to build credibility for the quantum technology field. **"Reduce the Hype, Understand the Progress."** In 2023, I developed a NetZero strategy using 32 WEF2023 panels and associated policy and business white papers for a quantum computer company to support their climate change mandate. In 2024, I digested 500 hybrid classical-quantum research articles to determine hybrid quantum-classical computing trends and >150 Use Cases. Then I wrote 50 quantum stories in a 2-mo blitz to build a community around a quantum business intelligence brand. In 2025, while I was waiting for a quantum startup's funding round to close, I developed a Quantum Ecosystems Course, then I built an OSINT team which built a platform (https://hwt.lv) around my around my war resilience data. Building Deep Tech Ecosystems is in my dna'.

My life's work since 1981 demonstrates a principle of career driving one's education, rather than the other way around. On the small scale, my PhD and postdoc scientific work is in cosmic dust charging and dynamics. On the large scale, working for twelve different NASA research teams for 18 years as a computational physicist in the first half of my career grew my space network and granted me access to academia, where I was publishing papers before I earned my PhD (2001) on two continents.

Starting in 2014, my reach for my own society-meaningful sustainable space projects began. In 2014 was my try for creating planetary small bodies department at the University of Latvia. The years 2015-2016 were the co-founding and closing of the Latvian subsidiary of the asteroid mining company: Deep Space Industries, which taught me my first space resource utilisation business lessons. That 2016-year also began my work on the intersections between **asteroid miners and asteroid scientists** ('ASIME'). Continuing my space resource utilisation interests, in 2016-2018, I supported my partners at the Irish company Terrestrial Celestial Materials' (TCM) to fund a 6M€, 3D metal printer in microgravity project in Luxembourg, where we wrote 5 yr, 10 yr ISRU business plans. Since 'Baltics in Space' (BiS) had become my established (2017) non-profit, I used BiS to support my development and successful implementation of the local organizing for the 1000-Abstract, 40 country-participant conference: **European Planetary Science Congress 2017 Riga**, where I led the local organization of a 4-country, nearly 200 person, and 145 K€ effort. Thus the integration of Baltic space entities was born. Large impact project development continued: in 2018-20; I developed a Baltic 2M€, 4-country, then 6-country, 10-partners, **climate-change-with-a cubesat, citizen science project**: "ELLF" in two large H2020 proposals. We didn't win either, but the second *we scored highly (12.5) in a*

3% selected rate competitive call, and we will try again.

In my ESA and NASA missions support work, I have assisted mission planning and analyzed data from the space missions: New Horizons, Rosetta (most recently: as a GIADA instrument data archive reviewer), Ulysses, GORID/Express, Cassini, Galileo, SOHO, Kuiper Airborne Observatory, NASA's ER-2 aircraft, Voyager 2, Pioneer Venus Orbiter, the Infrared Astronomical Satellite (IRAS), the Space Shuttle's SpaceLab 2, and ground-based telescopes in Latvia, Hawaii, California, and Arizona. Additionally, The data includes calibration star cluster fields, dust from Saturn's and Jupiter's magnetosphere and Earth's geostationary orbit, the Sun, Comet Shoemaker-Levy 9, Comet Halley, Supernova 1987a, Venus, Mars, Io, Mercury, the Moon, Saturn's and Uranus' rings, asteroids, Earth's atmosphere, protostars, molecular clouds, galaxies, novas, main-sequence stars, and the exhaust-cloud around the Space Shuttle. I'm on the Science team of ESA's new Comet Interceptor mission.

I am an active advocate for Quantum Technology Ecosystems, Society War Resilience, Netzero, asteroid mining, Eastern European planetary scientists, girls in STEM, and Baltic Space workers.

- **March 2017-Present** *Executive Director and Founder*. Social Enterprise: Baltics in Space to carry my Baltics space-capacity building and asteroid mining projects, and soon: Quantum Progress. First success of BiS: Developed and implemented the local organization for the European Planetary Science Congress 2017 Riga for the Europlanet-RI2020 Consortium: a 145 KEur project, 15 parts, nearly 200 Baltic space workers involved. Baltics in Space currently has six projects in development for meeting local, Baltic, European and International needs.
- **April 2016-Present** *Independent Consultant*. Quantum Progress Writing Service: a quantum technology analysis for news orgs and investors. Proposal writing support to Baltic entities. Expert H2020 SME Space Industry and EIC reviewer. Implemented Climate Change Study Case for Finnish Meteorological Institute on H2020-funded EOPEN for Community-accessible Earth Observation data. Building an Asteroid mining community, linking science and industry: 'ASIME'. Observer status of Hague International Space Resources Governance Working Group. Developed the science of the ASIME 2018 for the Luxembourg Ministry of the Economy, to address the asteroid composition questions. Developed and implemented the Asteroid Science In-space Mine Engineering (ASIME) 2016 conference for the Luxembourg Ministry of the Economy to bring the asteroid scientists and the asteroid mining companies together and address key issues.
- **May 2015-January 2017** *Chief Scientist-Europe, Deep Space Industries Europe, S.à.r.l. (Luxembourg), then DSI Latvia, SIA*. Building European teams & mission scenarios for the support of asteroid mining. DSI-L subsidiary transitioned to company: Heliocentric Technologies Latvia in 2/2017.
- **July 2014-April 2015** *Science Team, Deep Space Industries, (USA)*. Building project teams and proposals in Europe for the support of asteroid mining.
- **April 2014-November 2021** *Lead Scientist: University of Latvia, Institute of Astronomy* Multiple approaches to bring planetary science to the University of Latvia and to support Latvia as a new member state in the European Space Agency. Founding member of the Latvian Space Bureau. Funded Europlanet-RI Work Package for astronomy education with a Rasberry Pi microcontroller. Funded by the Fotonika-LV grant through April 2015. One unsuccessful attempt to build a new planetary small bodies research department. Guiding a PhD student on Ceres OH detection with the VIRAC 32-m radio telescope. Support of space debris observations at the Riga Satellite Laser Ranging Station and at VIRAC. Support of Baldone Observatory digitization of 20,000 plates (1968-2001) for asteroid and comet recovery. Set up COST action: "ORIGIN" for astrobiology support for Latvian students and researchers.
- **August 2013-March 2014** *Research Scientist: University of Latvia, Institute of Astronomy*. In recruitment for European Commission funded research. Two Marie Curie proposals submitted (Submitted, but they were not reviewed by the European Commission).
- **April 2012-Present** *Senior Scientist: Planetary Science Institute, (April-May: Boulder, Colorado, >June 2012: Riga, Latvia)* Circum/interplanetary dust charging and dynamics. Five NASA grant

proposals submitted. One Honda Foundation STEM proposal submitted. Two Co-I NASA proposals accepted: TREX, a NASA SSERVI node and an SSW Io plasma torus (Jupiter dust) study.

- **November 2007-March 2012** *Researcher: Southwest Research Institute (SwRI), Boulder, Colorado.* Mission work for the Ralph camera on board the New Horizons Pluto mission and continuing my circum / interplanetary dust charging and dynamics and the origin of water on the terrestrial planets. Ten grant proposals submitted; seventh proposal was funded.
- **2006-2007** *Associate Research Scientist: Planetary Science Institute, Tucson, AZ.* Started the path of self-funded research by submitting three grant proposals. Third (2007) proposal was funded; transferred that project to SwRI.
- **January 2003-October 2007** *Scientific Researcher: Istituto di Fisica dello Spazio Interplanetario, INAF Rome.* Mission support for both existing and in-the-process-of-being- built infrared spectrometers on space missions: Dawn (VIR), Cassini (VIMS), and Rosetta (VIRTIS). Europlanet Small Bodies and Dust N2 Working Group Coordinator. Editor with H. Krueger of book we produced in LaTeX of 55 articles: Proceedings of the Dust in Planetary Systems (Workshop, Sept 26-30, 2005, Kauai, Hawaii), SP-643 January 2007.
- **2004-2005** *Adjunct Assistant Professor of Astronomy, American University of Rome, Rome, Italy.* Astronomy instructor for the liberal arts university students.
- **April 1998-December 2002** *Graduate student/Post-doc: Max-Planck-Institut für Kernphysik and University of Heidelberg.* Examined circum/interplanetary dust charging and dynamics, including Io as the origin of the Jovian dust streams, using in-situ dust data from the Galileo and Cassini spacecraft dust instruments.
- **1995-1998** *Scientific Programming: Solar Oscillations Investigations Project, Stanford University, California.* Image processing and helioseismic oscillation software, and solar education materials for the MDI SOHO instrument.
- **1995-1996** *Scientific Programming Consultant: Research Systems, Boulder, Colorado.* Wrote wavelet software for the IDL programming language.

1995

- *Scientific Applications Consultant: Advent Systems, Mountain View, California.* Wavelet programming and radar data reduction

1994

- *Research Scientist: Bay Area Environmental Research Institute, San Francisco, and NASA-Ames Research Center, Moffett Field, California.* Wavelet algorithms and applications.
- *.Numerical Analysis Consultant: Alliance Laboratories, Redwood City, California.* Updated and rewrote thermocouple numerical analysis programs.

1993

- *Consultant: NASA-Ames Research Center, Moffett Field, California.* Wrote bimonthly Digital Explorations newsletter for Atmospheric and Space Sciences divisions.
- *Consultant: Apple Computer, Cupertino, California.* Wrote User and Programmer manuals for the Scientist's Workbench application.
- *Consultant: Franklin and Marshall College, Pennsylvania.* Created list of infrared-excess star candidates for Infrared Space Observatory observations.
- **1986-1994** *Software Specialist II: Sterling Software, NASA-Ames Research Center.* Infrared data analysis and interpretation for astronomical and atmospheric data from KAO, SpaceLab 2, ER-2, ground-based telescopes, laboratory prototype instruments, and simulated tropospheric data, database development for three ER-2 atmospheric missions, dynamics of chaotic orbital evolution of solar system objects, UV ring occultation data analysis from Voyager 2, detecting circumstellar dust around main sequence stars, beta-testing of Macintosh scientific commercial software, writing/ editing technical manuals, systems operations for eight Macintoshes,

Unix systems administration for two Silicon Graphics workstations. Modified and applied LaTeX scripts to follow Kluwer Academic Publisher's requirements to produce book: Interstellar Dust by Allamandola and Tielens (eds.), Kluwer, 1989. Forty-four chapters, figures, color plates, preface, table-of-contents, subject index, object index, index of molecules.

- **1984-1986** *Professional Research Assistant: LASP, University of CO, Boulder, Colorado.* Ultraviolet data analysis for planetary ring data from the Voyager 2; and ultraviolet data analysis for Venus atmospheric and Comet Halley data from the Pioneer Venus.
- **1982-1984** *Technical Assistant: Jet Propulsion Laboratory, Pasadena, California.* Ultraviolet data analysis for planetary ring data from the Voyager 2 Photopolarimeter Project.
- **1981-1986** *Research Assistant: Jet Propulsion Laboratory, Pasadena, California.* Technical assistance for systematic photographic search for asteroids with Palomar Observatory's Schmidt telescopes. **Co-discoverer of Near Earth asteroid 1982 XB**.

Publications 12 leading author/23 co-author publications & 70 presentations since 1982.

Dust in the Solar System (including Earth debris)

- Krüger, H.; Bindschadler, D.; Dermott, S. F.; **Graps, A. L.;** Grün, E.; Gustafson, B. A.; Hamilton, D. P.; Hanner, M. S.; Horányi, M.; Kissel, J.; Linkert, D.; Linkert, G.; Mann, I.; McDonnell, J. A. M.; Moissl, R.; Morfill, G. E.; Polanskey, C.; Roy, M.; Schwehm, G.; Srama, R., (2010). "Galileo dust data from the Jovian system: 2000 to 2003", *Planetary and Space Science*, Volume 58, Issue 7-8, p. 965-993. 06/2010 DOI: 10.1016/j.pss.2010.03.003
- **Graps, A.L**, Jones, G.H., Juhasz, A., Horanyi, M., Havnes, O. (2008), "The Charging of Plane- tary Rings", in Planetary Atmospheric Electricity, ed.: Aplin K., Harrison R.G., Leblanc F.,Treumann R., Yair Y., Space Sciences Series of ISSI, Springer.
- Krüger, H.; Dikarev, V.; Anweiler, B.; Dermott, S. F.; **Graps, A. L.**; Grün, E.; Gustafson, B. A.; Hamilton, D. P.; Hanner, M. S.; Horányi, M.; Kissel, J.; Linkert, D.; Linkert, G.; Mann, I.; McDonnell, J. A. M.; Morfill, G. E.; Polanskey, C.; Schwehm, G.; Srama, R. (2010). "Three years of Ulysses dust data: 2005 to 2007", *Planetary and Space Science*, Volume 58, Issue 7-8, p. 951-964. 06/2010, DOI: 10.1016/j.pss.2009.11.002.
- **Graps, A.L.** (2006), "Characterization of Jovian Plasma-Embedded Dust Particles", *Planetary and Space Sciences*, Volume 54, Issue 9-10, Physics of Dusty Rings (special ISSI publication) Pages 911-918.
- **A. L. Graps**, Green, S.F., McBride, N.M., McDonnell, J.A.M., Bunte, K., Svedhem, H., and Drolshagen, G. (2006). "GEO Debris and Interplanetary Dust: Fluxes and Charging Behavior", in Dust in Planetary Systems, Krüger, H. and Graps, A. eds., ESA Publications, SP-643 (February 2007).
- Krüger, H., **Graps, A. L**. (editors). Proceedings of the Dust in Planetary Systems (Workshop, Sept 26-30, 2005, Kauai, Hawaii), SP-643 January 2007. This volume of 55 articles is available at NASA ADS.
- Krüger, Harald, **Graps, Amara L.**, Flandes, Alberto, Forsythe, Robert J., Hamilton, Douglas P., Horanyi Mihaly, Grün, Eberhard (2006). "Ulysses jovian latitude scan of electromagnetically interacting dust streams", *Planetary and Space Sciences*, Volume 54, Issues 9-10, Pages 919-931.
- Krüger, Harald; D. Bindschadler; S.F. Dermott; **A. L. Graps**; E. Grün; B.A. Gustafson; D.P. Hamilton; M.S. Hanner, M. Horányi; J. Kissel; B.A. Lindblad; D. Linkert; G. Linkert; I. Mann; J.A.M. McDonnell; R. Moissl; G.E. Morfill; C. Polanskey; G. Schwehm; R. Srama; H.A. Zook (2006). "Five years of Ulysses dust data: 2000-2004" (, *Planetary and Space Sciences*, Volume 54, Issues 9-10, Pages 932-956.
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I presented my dust in the solar system projects at:

Asteroids, Comets, and Meteors 2014, Helsinki, Finland / 2013 Division of Planetary Sciences, Denver, Colorado / 2013 Dusty Visions Stuttgart, Germany / 2011 Division of Planetary Sciences, Nantes, France / 2010 Dusty Visions Goettingen, Germany / 2010 American Geophysical Union, San Francisco, California / 2007 Southwest Research Institute Colloquium, Boulder, Colorado / 2007 International Space Science Institute 'Planetary Lightning Workshop (Bern, Switzerland)/ 2005 Dust in Planetary Systems, Lihue, Hawaii / 2005 International Space Science Institute 'Dusty Rings Workshop (Bern, Switzerland) / 2005 Division of Planetary Sciences, Cambridge, England / 2005 Consiglio Nazionale delle Ricerche Colloqium, Rome, Italy / 2005 VI Convegno di Scienze Planetarie, Aosta, Italy / 2004 COSPAR, Paris, France / 2004 Osservatorio Astronomico di Capodimonte Colloqium, Naples, Italy / 2003 Université de Fribourg Suisse Colloqium, Fribourg, Switzerland / 2003 Consiglio Nazionale delle Ricerche Colloqium, Rome, Italy / 2003 V Convegno di Scienze Planetarie, Gallipoli, Italy / 2003 Galileo-Ulysses-Cassini-StarDust 2003 Dust Workshop Noordwijk, Netherlands / 2003 Astrophysics of Dust, Estes Park, Colorado / 2003 EGS-AGU-EUG Joint Assembly, Nice, France / 2002 Galileo-Ulysses-Cassini-StarDust 2002 Dust Workshop, Potsdam, Germany / 2002 Asteroids, Comets, and Meteors 2002, Berlin, Germany / 2002 EuroJove Conference (Jupiter after Galileo and Cassini, Lisboa, Portugal / 2002 European Geophysical Society, Nice, France / 2001 Division of Planetary Sciences, New Orleans, Louisiana / 2001 ESC Seismic Phenomena Associated With Volcanic Activity, Tenerife, Canary Islands, Spain / 2001 Meteoroids, Kiruna, Sweden / 2001 Galileo-Ulysses-Cassini-StarDust 2001 Dust Workshop, Heidelberg, Germany / 2001 Jupiter Symposium, Boulder, Colorado / 2001 NASA-Ames Spaces Sciences Colloquium, Mountain View, California / 2001 Max-Plank-Institut für Kernphysik Colloquium, Heidelberg, Germany / 2000 Division of Planetary Sciences, Pasadena, CA / 2000 European Geophysical Society, Nice, France / 2000 IAU Symposium 181: Dust in the Solar System and Beyond, Canterbury, England / 1999 TU-Müchen, Fachbebiet Raumfahrttechnik, Garching bei Müchen, Germany / 1999 Division of Planetary Sciences, Padua, Italy / 1999 Galileo-Ulysses-Cassini-Stardust Dust Workshop, Münster, Germany / 1999 Asteroids, Comets, and Meteors 1999, Ithaca, New York / 1999 European Geophysical Society, Den Haag, The Netherlands / 1998 Division of Planetary Sciences, Madison, WI / 1998 Meteoroids, Tatranska Lomnica, Slovakia / 1998 Galileo-Ulysses-Cassini Dust Workshop, College Park, MD.

Origin of Water on Earth

- Lunine, Jonathan I.; O'Brien, David P.; Raymond, Sean N.; Morbidelli, Alessandro; Quinn, Thomas; **Graps, Amara L.** (2011). "Dynamical Models of Terrestrial Planet Formation", *Advanced Science Letters*, Volume 4, Number 2, pp. 325-338

I presented my origin of water on earth projects at:

2009 Southwest Research Institute Colloquium, Boulder, Colorado / 2007 Goldschmidt, Cologne, Germany / 2007 European Geophysical Union, Vienna, Austria

Wavelets Introduction

- **Graps, A.L.**; "An Introduction to Wavelets", *IEEE Computational Sciences and Engineering*, Summer 1995, pp 50-61. This paper was downloaded at my old site amara.com (Wayback machine: https://goo.gl/4jLKdg) by approximately *300,000 people* from 1995-2013, Wavelet Paper ***cited 2821 times*** (Google Scholar, February 2022), in others' papers, theses and books including: The Illustrated Wavelet Transform Handbook by Paul S. Addison (Institute of Physics Publishing, 2002), The World According to Wavelets by Barbara Hubbard (2000, AK Peters), and Discovering Wavelets by Edward Aboufadel and Steven Schlicker (1999, Wiley), Wavelet Paper *cited* ***in 56 Patents***

I presented my introduction to wavelets topic at:

2008 Southwest Research Institute Colloquium, Boulder, Colorado / 2003 ESC: Seismic Signals Related to Volcanic Unrest, Pantelleria, Italy / 2002 Etamax, Braunschweig, Germany / 1999 TU-Müchen, Fachbebiet Raumfahrttechnik, Garching bei Müchen, Germany / 1998 Cornell Astronomy Seminar, Ithaca, NY / 1997 One-day Workshop: for SmallTalk inventors: Alan Kay, Dan Ingalls plus Ted Kaehler and the rest of their Squeak Group (Disney), Palo Alto, CA / 1996 Stanford Helioseismology Seminar, Stanford, CA / 1995 Scientific & Engineering Applications on the Macintosh, San Francisco, CA.

Ultraviolet Observations (Saturn's/Uranus' Rings) from Voyager 2, (Interplanetary Lyman-alpha) from Pioneer, (asteroid Lutetia) from Rosetta

- Stern, S. A.; Parker, J. Wm.; Feldman, P. D.; Weaver, H. A.; Steffl, A.; A'Hearn, M. F.; Feaga, L.; Birath, E.; **Graps, A**.; Bertaux, J.-L.; Slater, D. C.; Cunningham, N.; Versteeg, M.; Scherrer, J. R. (2011). "Ultraviolet Discoveries at Asteroid (21) Lutetia by the Rosetta Alice Ultraviolet Spectrograph", *The Astronomical Journal*, Volume 141, Issue 6, article id. 199 (2011). DOI: 10.1088/0004-6256/141/6/199 published in print:06/2011.
- **Graps, A. L.,** M. R. Showalter, J. J. Lissauer, D. M. Kary (1995), "Optical Depth Profiles and Streamlines of the Uranian Epsilon Ring", *The Astronomical Journal* 109, 2262-2273.
- J.M. Ajello, A.I. Stewart, G.E. Thomas, and **A. Graps** (1987). "Solar Cycle Study of Interplanetary Lyman-Alpha Variations", *Astrophysical Journal* 317, 964-986.
- Arthur L. Lane, Charles W. Hord, Robert A. West, Larry W. Esposito, Karen E. Simmons, Robert M. Nelson, Brad D. Wallis, Bonnie J. Buratti, Linda J. Horn, **Amara L. Graps** (1986). "Photometry from Voyager 2: Initial Results from the Uranian Atmosphere, Satellites, and Rings", *Science* 233, 65-70.
- **A. L. Graps** and A. L. Lane (1986). "Voyager 2 Photopolarimeter Experiment: Evidence for Tenuous Outer Ring Material at Saturn", *Icarus* 67, 205-210.
- **A. L. Graps**, A. L. Lane, L. J. Horn, and K.E. Simmons (1984). "Evidence for Material between Saturn's A and F Rings from the Voyager 2 Photopolarimeter", *Icarus* 60, 409-415.
- Arthur L. Lane, **Amara L. Graps**, and Karen E. Simmons (1982). "The C-Ring of Saturn: A High Resolution View of Some of its Structure", in Planetary Rings, ed by A. Brahic, Cepadues-Edition Toulouse.

Infrared Observations (Molecular Clouds, the Moon)

- Sprague, A. L. , F. C. Witteborn, R. W. Kozlowski, D. P. Cruikshank, J. J. Bartholemew, and **A.L. Graps** (1993). "The Moon: Mid-Infrared (7.5-11.4 microns) Spectroscopy of Selected Regions", *Icarus* 100, 73-84.
- F. C. Witteborn, S. A. Sandford, J. D. Bregman, L. J. Allamandola, M. Cohen, D. H. Wooden, and **A.L. Graps** (1989). "New Emission Features in the 11-13 micron Region and Their Relationship to Polycyclic Aromatic Hydrocarbons", *Astrophysical Journal* 341, 270-277.

Funded Projects

- P.I. Grapa – European Space Agency Latvia PECS call, Educational Course: Introduction to Wavelets with Space Applications. €24,759. 2020. Institute of Astronomy reference number: WAV-EDU-01 ESA ITT: AO/1- 9953/19/NL/SC University of Latvia.
- *Provided main Triple Helix concept in 2017-8 VIRAC ERA-Chair 2.5 MEur winning LV proposal. *Provided small-planetary bodies research concept in 2018 LU-VIRAC 350 KEur winning LV proposal.

- Scientific Organizing Lead to implement the *Asteroid Science Intersections with In-Space Mine-Engineering (ASIME) 2018*. April 16-17. Belval, University of Luxembourg where we addressed one of the science knowledge gaps: asteroid composition. (https://asime.uni.lu). Nearly 70 attendees, industry participants: 26%, student participants: 10%, female speakers: 20%, female keynote speakers: 39%. The participants represented 14 countries including the USA, China, Japan, and S. Korea. White paper outcome: https://arxiv.org/abs/1904.11831
- Co-I., as Planetary Science Institute, NASA (Solar System Workings) - *The Ins and Outs of the Io Plasma Torus: understanding the relationship between material motion and energy flow using correlative study between two decades of optical and radio observations* (2017-2019).
- Co-I., as Planetary Science Institute, *NASA Solar System Exploration Research Virtual Institute 2016 (SSERVI16) "TREX: Toolbox for Research and Exploration"* (2017-2020).
- Co-I., as University of Latvia, *ESTLAT-2020. Training the next generation entrepreneurs with hands-on methods in space STEM (SpaceTEM)* (2017-2019).
- Initiator, Developer, Implementer of the *Asteroid Science Intersections with In-Space Mine-Engineering (ASIME) 2016*. September 21-22. Luxembourg City, Luxembourg. (http://fmispace.fmi.fi/index.php?id=asime16) 85-participants including engineers, technology transfer specialists, venture capital companies, and four Luxembourg sponsors. 80-page White Paper outcome with Science Knowledge Gaps: "Answers to Questions from the Asteroid Miners" (https://arxiv.org/abs/1612.00709) Funder: Luxembourg Ministry of the Economy.
- Three Baltic Bonus grants (funds were mostly absorbed by the University of Latvia administration) for my three high-scoring, but unaccepted, European Commission Horizon 2020 projects: *ENS-Net*, *C-DUST*, and *CATNAP*. February 2016.
- Co-I: Horizon 2020 INFRAIA-1-2014-2015 (Advanced Research Networks) *"EUROPLANET 2020"* (my contribution: *"Planetary Climate Detectives"*). Started funding in September 2015. (33 partners, 2014-2018: total 9.945 MEUR, my work package: 28KEur)
- Co-I/Advisor: Latvian Research Programme: *"Preparation of the instruments of Near Earth Object observation for ensuring safe cosmic space"* (2014-2016)
- Co-Investigator. (P.I.: Jeffrey Morganthaler) NASA Outer Planets Research. *"The Ins and Outs of the Io Plasma Torus: A Comparison of Two Decades of Io Plasma Torus and Io Volcanic Data"* (2013-2015, 387,421 USD)
- Principal Investigator. NASA Outer Planets Research. *"Can Ring Dust Impacts Alter the Surfaces of the Mid-sized Saturnian Moons?"* (2010-2013, 178,299 USD, no-cost extension: 2014-5)
- Principal Investigator. NASA Cassini Data Analysis Program. *"The Development of the Saturnian Dust Streams"* (2007-8, 113,265 USD)
- Member of European Centre of Science and Technology (COST): An Astrobiology project TD1308: *ORIGINS*, contribution to the icy satellites and planetary formation topics (2014-2018, 142 kEUR total for 90 members).
- Member of the FP7 project REGPOT-2011-1 Nr. 285912 FOTONIKA-LV "Unlocking and Boosting Research Potential for Photonics in Latvia – Towards Effective Integration in the European Research Area" (2011-2014, 400 kEUR).

Funded by Donations

- Participant at the UNOOSA / Holy See Seminar 'Exploration and Development of Space Opportunities and Issues in the Context of the Sustainable Development Goals' 27 – 28 March 2018, Castel Gandolfo. Funded by futurist David Orban.
- Chair of the Local Organizing Committee (LOC) of the European Planetary Science Congress 2017 Riga, the world's second largest planetary science conference. With a given allocation of time (1.5 years) and no initial local or European funds, Graps built a Baltic-wide program to represent eight Baltic institutes in the conference (exhibits, booklet), engage the Baltic

scientists in the scientific program, employ 6 students in the ground-floor, fund 25 early-career Baltic students to display their Summer 2017 internship space projects, invite and support 5 Baltic and European government Ministers talks, support a Solar System for Kids Exhibit which has so far (Summer 2019) reached 15,000 Latvian (600 visited during the conference week), supported the Latvian social event and art-science exhibits and communicated publicly (600 Latvian and International press mentions) about the event and the value of space for the Baltic region. The cost of the LOC was approximately 145 K€, with 190 Baltic people paid directly or in-kind at a cost of 113 K€.

Unfunded

- Deputy-PI (main concept and proposal writer): for Horizon 2020 SwafS- H2020-SwafS-2020-1: Hands-on citizen science and frugal innovation. "The Earth ILLumination Foundations for Citizen Science". (April 23, 2020). 2.2M€, 10-partners, 6-countries, with a nanosatellite, 35 deliverables, 2.2M€. **High Score: 12.5**
- Deputy-PI (concept and proposal writer): for Horizon 2020 SwafS-14-2018-2019: Supporting the development of territorial Responsible Research and Innovation. "Estonia- Latvia-Lithuania- Finland *"ELLF" Climate Change Cubesat (C^3) STEM*". (April 2, 2019). 10-partners, 4-countries, with nanosatellite, 35 deliverables, 2M€.
- Manager "Space" @ Terrestrial Celestial Materials: for 2016-7 Luxinnovation MetalWorks project (Luxembourg Ministry of the Economy: green light June 3, 2017). Prototype phase 3M€, Production phase: 3M€. Insufficient Luxembourg funding for protype phase.
- P.I., as DSI Latvia, built a 15-member team and submitted for the first time to European Space Agency, PECS call: AO/1-8437/15/NL/NDe – "An Asteroid Database from the Baldone Observatory Plates". November 2015.
- Co-I: for Horizon 2020 COMPET-05-2015 – "*C-DUST: Cometary environment: light scattering and interaction with dust and plasma*". (April 8, 2015). (high score: 11.5)
- Co-I: for Horizon 2020 COMPET-05-2015 – "*CATNAP: Cartography and Analysis Tools, Numerical modeling, Atmospheric models for Planetary science*". (April 8, 2015). (high score: 12.5)
- 2014 P.I. "An Asteroid and Comet Database from the Baldone Observatory", NASA Planetary Data Analysis and Archiving Program 2014 (PDART-2014).
- 2014 P.I.: Horizon 2020 Widespread 1-2014: ERA-Chair. *"BOUNCE: Turn Loose the Excellence of the University of Latvia's Planetary Small Bodies*". (2.5 MEUR). An unauthorized copy of this work into a competing proposal had repercussions through LU, the Latvian Ministry of Science and Education and European Commission DG Research (Brussels). I wrote a White paper to the Latvian Ministry of Education and Science to summarize lessons
- 2014 Co-I: Horizon 2020 PROTEC-2014 *"The European NEO Science Network (ENS-Net)"* (my contribution: An Asteroid Regolith Database). (high score: 12.5)
- P.I. 2011, 2012, 2013+ NASA Planetary Geology and Geophysics Program. *"Electrostatic Dust Alterations of Asteroid Surfaces"*

Awards / Special Mention

- 2018 Europlanet Public Engagement Prize, for years of public engagement.
- Asteroid 'Graps': (9027) Graps = 1988 VP5 = 1981 UT11 = 1995 WJ6

https://goo.gl/k362xd

Personal Skills and Competences

Mother tongue(s)	English
Other language(s)	

Self-assessment	Understanding	Speaking	Writing

	Listening		Reading		Spoken interaction		Spoken production			
Language	DE	A2		A2		A2		A2		A2
Language	IT	A2		A2		A2		A2		A2
Language	LV	A2		A2		A2		A2		A2

Organisational skills and competences

Scientific team projects. 30 years experience as team member, 10 years experience as team leader and project coordinator.

Technical skills and competences

Astronomical/Atmospheric space mission support, data reduction and interpretation. 30 years experience.

Technical writing. 30 years experience.

Business Plan and Pitch Deck writing: 4 years experience. Grant proposal writing: 20 years experience: USA and European funding agencies. Other technical strengths include: Running event sponsorship programs and crowd-funding campaigns, Non-profit company management, Pricing event assets, Communication with policy-makers and company executives, Rasberry Pi microcontrollers, Dust physics, Computational physics, numerical analysis, infrared and ultraviolet data acquisition and analysis, popular science writing, technical writing, statistics, database design, computer graphics.

Computer skills and competences

Skilled in most standard word processors and spreadsheets.

Programming. 16 years experience. Some Unix system admin.

Computer Languages and Operating Systems:

Python, IDL, Matlab, Perl, HTML, Drupal, TeX, LaTeX, IRAF, Pascal, Fortran, Basic; PiTop, Linux, DEC: VMS; APPLE: Macintosh; IBM: DOS; Unix: Mac OSX, Silicon Graphics, Sun.