


Attila Kovács	Location: Bonn, NRW, Germany Citizenship: USA + Hungary Languages: English (<i>fluent</i>), Hungarian (<i>native</i>), German (<i>B1</i>), Italian (<i>intermediate</i>)			
Contact	Email: attila@sigmyne.com Web: https://www.sigmyne.com/attila	Tel: (626) 497-2404, +49 172 345-8028 https://www.linkedin.com/in/attila-kovacs-080388/		
Employment	2016 — Owner (scientific consulting), Sigmyne LLC, Minneapolis, MN 2017 — 2026 Computer Engineer (GS-14), Submillimeter Array (SMA) Center for Astrophysics Harvard & Smithsonian, Cambridge, MA 2012 — 2016 Postdoc , Submillimeter Technology Group, Caltech, Pasadena, CA 2009 — 2011 Postdoc , University of Minnesota, Minneapolis, MN 2006 — 2009 Postdoc , Max Planck Institute for Radio Astronomy (MPIfR), Bonn, Germany			
Education	2006 Ph.D. Physics, Caltech, Pasadena, CA 1997 A.B. Physics, Astronomy & Astrophysics, Harvard College, Cambridge, MA			
Interests	<ul style="list-style-type: none"> - Astronomical instrumentation and cryogenic detector development - Distributed systems, e.g. for telescope control, robotics - Data reduction, real-time signal processing (esp. on GPUs), numerical algorithms - Maximally efficient and scalable parallel algorithms (whether on CPU, GPU, or HPC) - AI as a tool for increasing productivity and automation 			
Key Innovations	<ul style="list-style-type: none"> - SuperSpec lithographic filterbank spectrometer for the far-infrared - far-infrared data collection (e.g. Lissajous patterns) and data reduction (CRUSH) paradigms - GPU-based chirp readout for Kinetic Inductance Detectors (KIDs) - SMA-X real-time database for hierarchical data and metadata in distributed systems - SuperNOVAS high-performance, high-precision, C/C++ astrometry library - Spectral Energy Distribution (SED) model for power-law dust temperature distributions - $P(D)$ deep field number counts modeling through Bayesian inference 			
Impact Metrics	Papers: 92 Citations: 6067 Normalized Citations: 584 <i>h</i> -index: 35 <i>g</i> -index: 77 <i>i10</i> index: 71			
Key Projects	<p>Data reduction pipeline for the NASA POEMM Mission On-board and science pipeline + data format development (CRUSH) astrometry, Java, data reduction algorithms, multi-threading, real-time, data reduction, statistical analysis, numerical algorithms, imaging, FITS format</p> <p>2024 — 2025 Interferometric on-the-fly (OTF) mapping with the SMA. Implementation, control tools, and real-time data validation. astrometry, C99, ONC RPC, real-time, distributed systems, multi-threading, Redis, LynxOS</p> <p>2024 — Linux packager for Fedora/EPEL and Debian Maintainer of several Linux packages of scientific and related software Linux, GNU make, CMake, fedpkg, dpkg</p> <p>2024 — SuperNOVAS C/C++ high-precision astrometry library Creator and main developer astrometry, C99, C++, algorithms, IAU & IERS conventions, portability, GNU make, CMake, static analysis, unit testing, git, gdb, valgrind, Doxygen, GitHub Actions, vcpkg, Homebrew</p> <p>2023 — Readout backend software for the A-MKID camera at the APEX telescope Design & implementation (collecting from 24 FPGA boards asynchronously) TCP/IP, UDP, socket-level, multi-threading, real-time, C, waveform generation, FFT, up/down conversion, IF level control, digital delays, bandpass, kinetic inductance detector (KIDs).</p> <p>2022 Astronomical telescope control system for the MIT Haystack 37-m telescope Design and implementation astrometry, C, multi-threading, real-time, TCP/IP, UDP, socket-level, ONC RPC, Redis, SystemD, CLI, bash, CPython, Lua, doxygen, git, gdb, valgrind</p> <p>2021 — nom.tam.fits Java library for handling FITS images Maintainer / lead developer Java, multi-threading, optimized I/O, Maven, JUnit 5, SpotBugs, Github Actions, FITS format.</p>			

2020 —	<p>SMA-X real-time hierarchical database for distributed systems Creator and sole developer C99, socket-level, low-latency, high-throughput, multi-threading, portability, Redis, SSL, PUB/SUB, Lua, JSON, git, gdb, valgrind, doxygen, GitHub Actions, SystemD, PostgreSQL</p>
2018	<p>µMUX readout adapter interface for BICEP3 / Keck array at the South Pole Design and implementation C, C++, bash, ssh tunnels, port forwarding, Javascript, HTML</p>
2017 —	<p>Real-time software ecosystem for the Smithsonian's Submillimeter Array (SMA) observatory Lead maintainer and developer (~400,000 lines of code) project management, C, bash, perl, CPython, Python, real-time, distributed systems, RPC, socket-level, device drivers & IO, interrupts, VME, multi-threading, portability, Linux, LynxOS, monitoring & control (RS-232, RS-485), kernel modules, remote process management, GNU make, git, gdb, valgrind, static analysis, GitHub Actions.</p>
2014 — 2019	<p>Data reduction pipeline for the NASA SOFIA / HIRMES and SOFIA / HAWC+ instruments Design and implementation astrometry, Java, algorithm development, observing mode, statistical analysis, numerical analysis, FFT, FITS format</p>
2012 — 2017	<p>GPU-based GPS chrip readout for Kinetic Inductance Detectors (KIDs) Novel concept, design, and implementation C, CUDA, GPGPU, DAQ, RDMA, DMA, interrupts, PCIe, multi-threading, IF engineering, FFT, high-throughput, parallel reductions & algorithms, signal processing, real-time.</p>
2012 — 2017	<p>SuperSpec lithographic spectrometer Inventor and circuit simulations lithographic mm-wave detectors, superconducting devices, circuit simulation, resonators, C++, SuperMix, filterbanks, IF engineering</p>
2012 — 2015	<p>MAKO 350um KID camera at the Caltech Submillimeter Observatory (CSO) GPU-based readout, data reduction pipeline design & development, characterization real-time, signal processing, astrometry, data reduction, multi-threading, Java, GPU, CUDA, C, kinetic inductance detectors (KIDs), IF engineering, distributed systems, ONC RPC</p>
2012 — 2015	<p>GISMO camera (NASA GSFC) at the IRAM 30-m telescope Data reduction pipeline, characterization, calibration, and troubleshooting astrometry, Java, detectors, optics, pointing model, statistical analysis, numerical methods</p>
2009 — 2016	<p>Cameras and polarimeter for the APEX telescope (LABOCA, SABOCA, PoIKA) Data reduction pipeline (CRUSH), DAQ system design, characterization, and calibration astrometry, polarimetry, imaging, Java, electronics, real-time, DSP, digital filtering, statistical analysis, algorithm development, bolometers, SQUID MUX, optics troubleshooting,.</p>
2005 —	<p>Star-formation in nearby galaxies and in the high-redshift Universe Observations, data analysis, modeling, and interpretation astronomy, deep fields, ISM, dust models, optical depth, radiative transfer, CO spectroscopy, deep fields, Monte-Carlo simulations, $P(D)$ modeling, Bayesian inference, polarimetry</p>
2002 — 2017	<p>CRUSH data reduction pipeline for far-infrared cameras Design and implementation, including novel algorithms statistical / numerical analysis, Java, FFT, Wiener filtering, noise whitening ($1/f$ noise), common-noise removal, despiking, astrometry, multi-threading, FITS format, imaging</p>
1999 — 2006	<p>Wide-RF / wide-IF SIS mixer chip designs for the Caltech Submillimeter Observatory (CSO) SIS balanced mixer chip design & non-linear circuit simulations RF & IF circuit simulations, impedance matching, harmonic mixing, C++, lumped element filters, superconductors, optimization, simulated annealing, SuperMix</p>
1997 — 2006	<p>SHARC-2 350um camera at the CSO Data acquisition, observing mode, data reduction pipeline (CRUSH) readout electronics design, DSP, DAQ system design & software, Java, observing mode design, data reduction pipeline (CRUSH), characterization, calibration, operations</p>
Service	<p>NASA APRA / SAT grant review panelist (2019, 2020) and panel chair (2021, 2023) Journal referee for ApJ, A&A, MNRAS, PASP, JLTP, JATIS SMA Time Allocation Committee (TAC) member (2019 —) Grant reviewer for Fondecyt, Chile (2009) Open-source software contributor (2009 —)</p>