# Applications supporting Xeon Phi usage

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Applications supporting Xeon Phi usage 1

Astrophysics 1

Climate and Weather 2

Digital Content Creation 3

Energy 3

Financial Services 4

Geophysics 5

Languages and Development Tools 5

Libraries 6

Life Sciences 7

Manufacturing 9

Material Sciences 10

Nanotechnology 11

Physics 11

Scientific Visualization 12

## Astrophysics

| **Application/Code** | **Description** | **Status** | **For More Information** |
| --- | --- | --- | --- |
| **Astrophysics codes** | COSMOS directly tests mathematical theories against the latest observational data. | Ongoing | [Information](http://www.ctc.cam.ac.uk/news/140108_newsitem.php)  [Article: 100X Speedup on Cosmology Code](http://www.hpcwire.com/2015/08/24/cosmos-team-achieves-100x-speedup-on-cosmology-code/)  [White paper: SGI](http://www.sgi.com/pdfs/4523.pdf)  [Article: COSMOS at Cambridge Intel PCC](http://www.hpcwire.com/off-the-wire/cosmos-award-ipcc-status-intel/) |
| **GADGET** | Software for cosmological N-body/SPH simulations | Ongoing | [Leibniz Supercomputing Center](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-leibniz-supercomputing-centre-and-technische-universit-t) |
| **Hogbom Clean Benchmark - ASKAP** | Used to benchmark a variety of platforms for the Australian SKA Pathfinder (ASKAP) Science Data Processor | Complete | [Recipe/download code](https://software.intel.com/en-us/articles/recipe-building-and-optimizing-the-hogbom-clean-benchmark-for-intel-xeon-phi-coprocessors) |
| **Walls – 3D Stencil Code** | Simulates the evolution of a network of domain walls in the early universe | Complete | [White paper SGI\* Unveiling the Early Universe](http://www.sgi.com/pdfs/4523.pdf)  [Article: WALLS 30X Speedup](http://www.techenablement.com/intel-xeon-phi-provides-cambridge-30x-speedup-in-production-cosmos-walls-code/) |

## Climate and Weather

| **Application/Code** | **Description** | **Status** | **For More Information** |
| --- | --- | --- | --- |
| **ADCIRC** | Advanced CIRCulation is a community-based shallow water model | Ongoing | [University of  Oklahoma](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-the-university-of-oklahoma) |
| **CAM5** | Community Atmosphere Model (CAM) is the latest in a series of global atmosphere models developed primarily at the National Center for Atmospheric Research (NCAR). | Ongoing | [LBNL Intel PCC Information](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-lawrence-berkeley-national-laboratory)  [Article: LBNL and Intel PCC Announcement](http://crd.lbl.gov/news-and-publications/news/2014/berkeley-lab-intel-to-collaborate-in-updating-scientific-codes-for-manycore-architectures/" \t "_blank)  [Article: Codes for Studying Climate Change](http://www.scientificcomputing.com/news/2014/07/codes-studying-climate-change-chemistry-focus-labs-intel-parallel-computing-center" \t "_blank) |
| **CESM** | Climate System Research to understand and predict climate systems | Ongoing | [University of Colorado & NCAR](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-the-university-of-colorado-boulder-and-the-national)  [Information](http://www.cesm.ucar.edu/events/ws.2014/Presentations/SEWG/dennis.pdf" \t "_blank) |
| **CFSv2** | Numerical weather prediction and [climate model](http://en.wikipedia.org/wiki/Climate_model" \o "Climate model" \t "_blank) | Ongoing | [C-DAC Intel PCC Information](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-center-for-development-of-advanced-computing-c-dac) |
| **COSMO** | High-precision numerical weather prediction system | Ongoing | [ETH Zurich Intel PCC Information](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-eth-zurich)  [System config](http://www.cosmos.damtp.cam.ac.uk/" \t "_blank) |
| **ECHAM6** | New major version of the series of atmospheric general circulation models | Ongoing | [CSC Finland](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-csc-it-center-for-science) |
| **HARMONIE** | Regional weather forecasting model | Ongoing | [Irish Centre for High-End Computing (ICHEC)](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-ichec) |
| **HBM** | 3D Ocean Model | Complete | [Recipe/download code](https://software.intel.com/en-us/articles/hbm-for-the-intel-xeon-phi-coprocessor)  [Information](http://www.techenablement.com/better-concurrency-and-simd-on-the-hiromb%E2%80%90boos%C2%AD%E2%80%90model-hbm-3d-ocean-code/" \t "_blank) |
| **Model for Prediction Across Scales (MPAS)** | Project for developing atmosphere, ocean and other earth-system simulation components for use in climate, and weather studies | Ongoing | [University of  Colorado & NCAR](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-the-university-of-colorado-boulder-and-the-national)  [Information](http://mpas-dev.github.io/) |
| **NASA Overflow** | Compressible 3-D flow solver that solves time-dependent Reynolds-averaged Navier-Stokes equations | Complete | [Benchmark](http://www.intel.com/content/www/us/en/benchmarks/server/xeon-phi/xeon-phi-physics.html" \t "_blank) |
| **NOAA NIM** | Non-hydrostatic Icosahedral weather forecasting model |  | [Recipe/download code](https://software.intel.com/en-us/articles/noaa-nim-with-support-for-intel-xeon-phi-coprocessor) |
| **Weather Research and Forecasting model (WRF)** | Numerical weather prediction system | Complete | [University of Colorado & NCAR](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-the-university-of-colorado-boulder-and-the-national) and [University of Wisconsin-Madison](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-the-university-of-wisconsin-madison)  [Recipe/download code](https://software.intel.com/en-us/articles/how-to-get-wrf-running-on-the-intelr-xeon-phitm-coprocessor)  [Recipe/download code for conus2.5km in Symmetric mode](https://software.intel.com/en-us/articles/wrf-conus25km-on-intel-xeon-phi-coprocessors-and-intel-xeon-processors-in-symmetric-mode) |

## Digital Content Creation

| **Application/Code** | **Description** | **Status** | **For More Information** |
| --- | --- | --- | --- |
| **EMBREE** | Collection of high-performance ray tracing kernels | Complete | [Recipe/download code](https://software.intel.com/en-us/articles/running-embree-on-intelr-xeon-phitm-coprocessor-0) |
| **EMBREE based Viewport Plugin** | Interactive content editing in an Autodesk Maya Viewport plugin | Complete | [Recipe/download code](https://github.com/embree/embree-renderer" \t "_blank) |
| **NEC Superresolution processing** | SD to HD video conversion | Complete | [Solution brief](https://software.intel.com/sites/default/files/NECCSR2.pdf) |

## Energy

| **Application/Code** | **Description** | **Status** | **For More Information** |
| --- | --- | --- | --- |
| **Acceleware\* AxRTM** | Library used for the accurate imaging of complex subsurface geologies. | Complete | [Information](http://www.acceleware.com/xeon-phi-training" \t "_blank) |
| **DownUnder GeoSolutions** | Seismic processing and interpretation solutions for Oil and Gas industry | Complete | [Announcement](http://www.sgi.com/company_info/newsroom/press_releases/2014/october/dug.html" \t "_blank)  [Video](https://www.youtube.com/watch?v=bY79DH5QXbQ" \t "_blank)  [Blog](http://blog.dugeo.com/dugs-new-super-computer/" \t "_blank) |
| **1D-Fast Fourier Transform (FFT)** | High performance, for low-communication 1DFFT | Complete | [Information](https://software.intel.com/en-us/articles/a-framework-for-low-communication-1-d-fft" \t "_blank) |
| **ISO3DFD** | Seismic Modeling code | Complete | [Benchmark](http://www.intel.com/content/www/xr/en/benchmarks/server/xeon-phi/xeon-phi-energy.html" \t "_blank)  [Recipe/download code](https://software.intel.com/en-us/articles/eight-optimizations-for-3-dimensional-finite-difference-3dfd-code-with-an-isotropic-iso)  [Blog](https://software.intel.com/en-us/blogs/2012/10/26/experiences-in-developing-seismic-imaging-code-for-intel-xeon-phi-coprocessor) |
| **RTM Petrobras Reverse Time Migration** | Seismic Imaging code | Complete | [Benchmark](http://www.intel.com/content/www/xr/en/benchmarks/server/xeon-phi/xeon-phi-energy.html" \t "_blank)  [Information](http://rice2014oghpc.blogs.rice.edu/files/2014/03/Intel-Rice2014-RTM-XeonPhi-V3.pdf" \t "_blank)  [Case study](https://software.intel.com/sites/default/files/managed/f1/e6/Intel-Cirrascale-and-Petrobras-Case-Study.pdf) |
| **Split Step Fourier PsDM (SSF PsDM)** | Optimized seismic image processing | Complete | [Article](https://software.intel.com/en-us/articles/optimize-seismic-imaging-processing-on-intel-xeon-phi) |
| **TTI 3DFD** | Used in developing Seismic Modeling | Complete | [Benchmark](http://www.intel.com/content/www/xr/en/benchmarks/server/xeon-phi/xeon-phi-energy.html" \t "_blank) |

## Financial Services

| **Application/Code** | **Description** | **Status** | **For More Information** |
| --- | --- | --- | --- |
| **Binomial Options Pricing Model** | Used to value options in quantitative Financial Services | Complete | [Recipe/download code](https://software.intel.com/en-us/articles/binomial-options-pricing-model-code-for-intel-xeon-phi-coprocessor) |
| **Binomial SP and DP** | Single and double precision benchmark in Financial Services | Complete | [Benchmark](http://www.intel.com/content/www/xr/en/benchmarks/server/xeon-phi/xeon-phi-fsi.html" \t "_blank) |
| **BlackScholes Merton Formula** | Financial derivative pricing | Complete | [Recipe/download code](https://software.intel.com/en-us/articles/black-scholes-merton-formula-on-intel-xeon-phi-coprocessor)  [Case Study](https://software.intel.com/en-us/articles/case-study-achieving-superior-performance-on-black-scholes-valuation-computing-using) |
| **BlackScholes SP and DP** | Financial Services double precision benchmarks | Complete | [Benchmark](http://www.intel.com/content/www/xr/en/benchmarks/server/xeon-phi/xeon-phi-fsi.html" \t "_blank) |
| **Monte Carlo European Options Pricing** | Model to calculate the value of options with multiple sources of uncertainty or with complicated features | Complete | [Recipe/download code](https://software.intel.com/en-us/articles/monte-carlo-european-option-with-pre-generated-random-numbers-for-intel-xeon-phi-coprocessor)  [Case Study](https://software.intel.com/en-us/articles/case-study-achieving-high-performance-on-monte-carlo-european-option-using-stepwise) |
| **Monte Carlo RNG SP and DP** | Simulation utilizing random numbers to model outcomes based on statistical or experiential data | Complete | [Benchmark](http://www.intel.com/content/www/xr/en/benchmarks/server/xeon-phi/xeon-phi-fsi.html" \t "_blank)  [Recipe/download code](https://software.intel.com/en-us/articles/monte-carlo-european-option-pricing-with-rng-interface-for-intel-xeon-phi-coprocessor) |
| **Monte Carlo SP and DP** | Financial Services benchmarks | Complete | [Benchmark](http://www.intel.com/content/www/xr/en/benchmarks/server/xeon-phi/xeon-phi-fsi.html" \t "_blank) |
| **STAC A2** | Benchmark for testing analytic workloads involved in pricing and risk management | Complete | [Benchmark](http://www.intel.com/content/www/xr/en/benchmarks/server/xeon-phi/xeon-phi-fsi.html" \t "_blank)  [Information](https://stacresearch.com/intel/haswell" \t "_blank) |
| **Xcelerit** | Acceleration tools for financial services, engineering, and research | Complete | [Blog](http://blog.xcelerit.com/benchmarks-intel-haswell-vs-xeon-phi/" \t "_blank) |

## Geophysics

| **Application/Code** | **Description** | **Status** | **For More Information** |
| --- | --- | --- | --- |
| **ELMER/Ice** | Ice sheet, glaciers, and ice flow modelling | Ongoing | [CSC Intel PCC Information](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-csc-it-center-for-science) |
| **SeisSol** | Earthquake/seismic simulation | Ongoing | [Leibniz Supercomputing Centre and Technische Universität München](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-leibniz-supercomputing-centre-and-technische-universit-t)  [Video: Petascale seismic simulations with SeisSol](http://seissol.geophysik.uni-muenchen.de/seissol_isc_small2.mp4" \t "_blank) |
| **SPECFEM3D Cartesian** | Simulates acoustic, elastic, coupled acoustic/elastic, poro-elastic, or seismic wave propagation | Ongoing | [CINECA Intel PCC Information](https://software.intel.com/articles/intel-parallel-computing-center-at-cineca)  [Code recipe location](http://geodynamics.org/cig/software/specfem3d/" \t "_blank) |
| **UTBench** | Benchmark code based on GeoFEM, solves 3D static linear-elastic problems in solid mechanics | Ongoing | [Univ Tokyo/ITC Intel PCC Info](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-information-technology-center-itc-the-university-of) |

## Languages and Development Tools

| **Application/Code** | **Description** | **Status** | **For More Information** |
| --- | --- | --- | --- |
| **Agner Fog’s Vector Class Library** | Tool that allows handling of multiple data in parallel thus speeding C++ code | Complete | [Get code](https://bitbucket.org/veclibknc/vclknc" \t "_blank) |
| **Allinea\* DDT and MAP** | Software development tools and application performance analytics | Complete | [Information](http://www.allinea.com/Intel-Xeon-Phi" \t "_blank) |
| **Intel® Parallel Studio XE 2016** | C++ and Fortran Compilers and Libraries, optimized libraries and routines, analysis, and optimization tools | Complete | [Information](https://software.intel.com/en-us/intel-parallel-studio-xe) |
| **Mathworks\* MATLAB** | Mathematical computations and visualization | Complete | [Recipe/download code](https://software.intel.com/en-us/articles/using-intel-math-kernel-library-with-mathworks-matlab-on-intel-xeon-phi-coprocessor-system/) |
| **Overhead and Speedometer** | Performance analysis tools to test app-to- system resource efficiency | Complete | [Information](https://01.org/simple-performance-tools" \t "_blank) |
| **PAPI** | Standard application programming interface (API) for accessing hardware performance counters | Complete | [Information](http://icl.eecs.utk.edu/papi/software/" \t "_blank) |
| **pyMIC** | Module for offloading from Python applications | Complete | [Get module](https://github.com/01org/pyMIC" \t "_blank) |
| **R software\*** | Open-source software environment for statistical computing and analysis | Complete | [Texas Advanced Computing Center](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-tacc)  [Recipe/download code](https://software.intel.com/en-us/articles/running-r-with-support-for-intel-xeon-phi-coprocessors) |
| **Rogue Wave TotalView and MemoryScape** | Tools and libraries to help developers create high performance, highly parallel applications | Complete | [Information](http://www.roguewave.com/products-services/totalview/features/xeon-phi" \t "_blank) |
| **Tuning and Analysis (TAU)** | Profiling and tracing toolkit for performance analysis of parallel programs | Complete | [University of Oregon](https://software.intel.com/en-us/articles/ipcc-at-university-of-oregon)  [Where to get TAU](http://www.cs.uoregon.edu/research/tau/home.php" \t "_blank) |

## Libraries

| **Application/Code** | **Description** | **Status** | **For More Information** |
| --- | --- | --- | --- |
| **Accelereyes ArrayFire** | Library of functions for matrix arithmetic, signal processing, linear algebra, statistics, and image processing | Complete | [Information](http://www.scientific-computing.com/press-releases/product_details.php?product_id=1347" \t "_blank) |
| **Boost** | C++ library project | Complete | [Recipe/download code](https://software.intel.com/en-us/articles/building-the-boost-library-to-run-natively-on-intelr-xeon-phitm-coprocessor) |
| **Libxphi** | Offloading capabilities for BLAS3 functions to dynamically linked binaries | Complete | [Get library](https://github.com/cdahnken/libxphi" \t "_blank) |
| **LIBXSTREAM** | Library to program with streams, events | Complete | [Download code](https://github.com/hfp/libxstream" \t "_blank) |
| **LIBXSMM** | Library for small matrix-matrix multiplications | Complete | [Get library](https://github.com/hfp/libxsmm" \t "_blank) |
| **MAGMA** | Dense linear algebra library | Complete | [Univ Tennessee/ICL Intel PCC Information](https://software.intel.com/articles/intel-parallel-computing-center-at-the-innovative-computing-laboratory-the-university-of)  [Get library](http://icl.cs.utk.edu/magma/software/view.html?id=233" \t "_blank) |
| **MPICH** | High performance and widely portable implementation of the Message Passing Interface (MPI) standard | Complete | [Information](http://www.mpich.org/" \t "_blank) |
| **MVAPICH2** | Provides support for hybrid MPI+PGAS programming models with unified communication runtime | Complete | [Get library](http://mvapich.cse.ohio-state.edu/" \t "_blank) |
| **NAG** | Numerical library for mathematical and statistical computation | Complete | [Get library](http://www.nag.co.uk/numeric/nag-library-phi" \t "_blank) |

## Life Sciences

| **Bioinformatics** | | | |
| --- | --- | --- | --- |
| **Application/Code** | **Description** | **Status** | **For More Information** |
| **BLAST** | DNA sequence match searching applications | Complete | [University of Tennessee/JICS](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-university-of-tennessee)  [Recipe/download code](https://software.intel.com/en-us/articles/blast-for-the-intel-xeon-phi-coprocessor) |
|  |  |  |  |
| **Bowtie 2** | Aligns read sequences to large genomes | Ongoing | [John Hopkins University](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-johns-hopkins-university) |
| **BWA – Burrows Wheeler Alignment Tool** | Maps low-divergent sequences against a large reference genome | Complete | [Recipe/download code](https://software.intel.com/en-us/articles/recipe-building-and-optimizing-bwa-aln-0510-for-intel-xeon-phi-coprocessors)  [Benchmark](http://www.intel.com/content/www/xr/en/benchmarks/server/xeon-phi/xeon-phi-life-sciences.html" \t "_blank) |
| **cryo-EM Technique (cryo Electron Microscopy)** | 3D biological structure extraction/analysis | Ongoing | [Dana-Farber Cancer Institute(DFCI) and Harvard Medical School](https://software.intel.com/en-us/articles/ipcc-of-structural-biology-at-dfci-and-harvard)  [DFCI Intel® PCCSB](http://ipccsb.dfci.harvard.edu/" \t "_blank) |
| **MPI-HMMER 2.3** | A hidden Markov model for analyzing protein sequences | Complete | [Recipe/download code](https://software.intel.com/en-us/articles/recipe-building-and-optimizing-mpihmmer-for-intelr-xeon-phittm-coprocessor)  [Benchmark](http://www.intel.com/content/www/xr/en/benchmarks/server/xeon-phi/xeon-phi-life-sciences.html" \t "_blank) |

| **Computational Chemistry** | | | |
| --- | --- | --- | --- |
| **Application/Code** | **Description** | **Status** | **For More Information** |
| **DiRAC Codes** | Compute molecular properties using relativistic quantum chemical methods | Ongoing | [Univ Edinburgh/Boyle Intel PCC Info](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-the-higgs-center-for-theoretical-physics-the-university) |
| **GAMESS** | Computational chemistry software (General Atomic and Molecular Electronic Structure System) | Ongoing | [Iowa State University](https://software.intel.com/en-us/articles/ipcc-iowa-state-university) |
| **Integral Calculation Library** | A library for calculation of electronic integrals | Ongoing | [Georgia Institute of Technology](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-georgia-institute-of-technology) |
| **NEURON** | Used for building and using computational models of neurons and networks of neurons | Ongoing | [San Diego Supercomputer Center Intel PCC Information](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-the-san-diego-supercomputer-center-university-of) |
| **NWChem** | Scalable computational chemistry tools and code | Complete | [Lawrence Berkeley National Laboratory Intel PCC Information](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-lawrence-berkeley-national-laboratory)  [Code recipe location](https://software.intel.com/en-us/articles/nwchem-for-the-intel-xeon-phi-coprocessor)  [Article: Intel Collaboration Announcement](http://crd.lbl.gov/news-and-publications/news/2014/berkeley-lab-intel-to-collaborate-in-updating-scientific-codes-for-manycore-architectures/" \t "_blank)  [Article: Codes for Studying Climate Change](http://www.scientificcomputing.com/news/2014/07/codes-studying-climate-change-chemistry-focus-labs-intel-parallel-computing-center" \t "_blank)  [White paper: NWChem Optimization for MIC](http://crd.lbl.gov/assets/pubs_presos/rpt83549.PDF" \t "_blank) |

| **Molecular Dynamics** | | | |
| --- | --- | --- | --- |
| **Application/Code** | **Description** | **Status** | **For More Information** |
| **AMBER** | A Molecular Simulation package | Complete | [SDSC Intel PCC Information](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-the-san-diego-supercomputer-center-university-of)  [Code recipe location](http://ambermd.org/xeon_phi/" \t "_blank) |
| **BUDE** | Molecular Docking | Ongoing | [University of Bristol Intel PCC Information](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-the-university-of-bristol) |
| **DL\_POLY** | General purpose, classical molecular dynamics simulation application | Ongoing | [Irish Centre for High-End Computing (ICHEC) Intel PCC Information](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-ichec) |
| **GROMACS** | A versatile molecular dynamics package | Complete | [Recipe/download code](https://software.intel.com/en-us/articles/gromacs-for-intel-xeon-phi-coprocessor)  [Benchmark](http://www.intel.com/content/www/xr/en/benchmarks/server/xeon-phi/xeon-phi-life-sciences.html" \t "_blank) |
| **LAMMPS** | A classic molecular dynamics application | Complete | [Recipe/download code](https://software.intel.com/en-us/articles/lammps-for-intel-xeon-phi-coprocessor)  [Benchmark](http://www.intel.com/content/www/xr/en/benchmarks/server/xeon-phi/xeon-phi-life-sciences.html" \t "_blank) |
| **NAMD** | A molecular dynamics application for simulation of large bio molecular systems | Complete | [University of Illinois at Urbana-Champaign](http://www.ks.uiuc.edu/Research/namd/" \t "_blank)  [Recipe/download code](https://software.intel.com/en-us/articles/namd-for-intel-xeon-phi-coprocessor)  [Benchmark](http://www.intel.com/content/www/xr/en/benchmarks/server/xeon-phi/xeon-phi-life-sciences.html" \t "_blank) |

## Manufacturing

| **Computer Aided Engineering (CAE)** | | | |
| --- | --- | --- | --- |
| **Application/Code** | **Description** | **Status** | **For More Information** |
| **Ansys\* Mechanical v.15 & v.16** | Finite element analysis tool for structural analysis, including linear, nonlinear, and dynamic studies | Complete | [Ansys\*](http://www.ansys.com/staticassets/ANSYS/staticassets/support/platform-support-ansys-15.0-detailed-summary.pdf" \t "_blank)  [Benchmark](http://www.intel.com/content/www/xr/en/benchmarks/server/xeon-phi/xeon-phi-manufacturing.html" \t "_blank)  [Case study](https://software.intel.com/en-us/articles/accelerating-ansys-mechanical-structural-analysis-with-intel-xeon-phi-coprocessors)  [Solution brief](https://software.intel.com/ansys-mechanical-on-xeon-phi" \t "_blank)  [Video](https://videoportal.intel.com/media/ANSYS%2A+Delivers+Fast%2C+Accurate+Engineering+Simulation+to+Speed+Time+to+Market/0_z3f7ayim" \t "_blank) |
| **CST** | 3D electromagnetic EDA simulation software | Complete | [Information](https://www.cst.com/Products/HPC/Xeon-Phi" \t "_blank)  [Video](https://youtu.be/5Kjait62gH8" \t "_blank) |
| **Mantevo MiniFE** | Mini-application encapsulating performance characteristics of an implicit finite element method application | Complete | [Recipe/download code](https://software.intel.com/en-us/articles/running-minife-on-intel-xeon-phi-coprocessors) |
| **SIMULIA Abaqus** | Visual tests and realistic simulation software | Ongoing | [Information](http://www.3ds.com/products-services/simulia/alliances/technology-partners/intel-corporation/" \t "_blank) |
| **Altair RADIOSS\*** | Highly scalable structural analysis solver for highly non-linear problems under dynamic loadings | Complete | [Case Study](http://www.pbsworks.com/ResLibDownload.aspx?file_id=1873&keywords=Intel+Case+Study%3a+Altair+Speeds+Complex+Simulations" \t "_blank)  [Video](https://www.youtube.com/watch?v=idsSt6EjPBk" \t "_blank) |

| Computational Fluid Dynamics (CFD) | | | |
| --- | --- | --- | --- |
| Application/Code | Description | Status | For More Information |
| AVBP | A parallel CFD code for reactive unsteady flow simulations on hybrid grids | Ongoing | [CERFACS Intel PCC Information](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-cerfacs) |
| FrontFlow/Blue code | Finite element program for geometrical calculations in moving boundary interface | Ongoing | [Univ Tokyo/CISS Intel PCC Information](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-center-for-research-on-innovative-simulation-software) |
| LBS3D | Simulation tools for multiphase flows | Complete | [Recipe/download code](https://code.google.com/p/mplabs/wiki/Using_LBS3D" \t "_blank) |
| OpenFOAM | Computational Fluid Dynamics | Ongoing | [Louisiana State University](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-the-lsu-center-for-computation-technology) |
| OpenLB | Open source Lattice Boltzmann code | Complete | [Download code](http://optilb.com/openlb/" \t "_blank) |
| ROTORSIM | Compressible finite-volume fluid simulation code | Ongoing | [Univ Bristol Intel PCC Information](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-the-university-of-bristol)  [White paper: Developing performance portable manycore codes](http://www.cs.bris.ac.uk/~simonm/publications/sms_stanford_talk_oct_2014.pdf" \t "_blank) |
| SU2 | Stanford University Unstructured (SU2), Computational Fluid Dynamics | Ongoing | [Stanford University](https://software.intel.com/en-us/articles/intel-parallel-computing-center-in-the-department-of-aeronautics-astronautics-at-stanford) |
| TAU and TRACE | Leading CFD solvers in the European aerospace industry | Ongoing | [ZIH Intel PCC Information](https://software.intel.com/en-us/articles/ipcc-zih) |

## Material Sciences

| **Application/Code** | **Description** | **Status** | **For More Information** |
| --- | --- | --- | --- |
| **Geant (Geometry and Tracking)** | Simulates the passage of particles through matter | Ongoing | [São Paulo State University (Universidade Estadual Paulista, UNESP) Intel PCC Information](https://software.intel.com/en-us/articles/intel-parallel-computing-center-sao-paulo-state-university)  [CERN Intel PCC Information](https://software.intel.com/en-us/articles/ipcc-at-cern-european-organisation-for-nuclear-research) |
| **GPAW** | Package for quantum mechanical simulations | Ongoing | [CSC Intel PCC Information](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-csc-it-center-for-science" \t "_blank) |
| **Quantum ESPRESSO\*** | Electronic-structure calculations and materials modeling at the nanoscale |  | [Cineca Intel PCC Information](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-cineca)  [Recipe/download code](https://software.intel.com/en-us/articles/quantum-espresso-for-intel-xeon-phi-coprocessor)  [Recipe:  Explicit Offload](https://software.intel.com/en-us/articles/explicit-offload-for-quantum-espresso) |
| **VASP** | Atomic scale materials modelling | Ongoing | [Zuse-Institut Berlin Intel PCC Information](https://software.intel.com/en-us/articles/konrad-zuse-zentrum-fur-informationstechnik-berlin-zib)  [Webinar: VASP Case Study](https://software.intel.com/en-us/ipcc/webinars) |

## Nanotechnology

| **Application/Code** | **Description** | **Status** | **For More Information** |
| --- | --- | --- | --- |
| **NEMO5** | Fifth edition of the NanoElectronics Modeling Tools | Ongoing | [Purdue University](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-purdue-university)  [NEMO5](https://engineering.purdue.edu/gekcogrp/software-projects/nemo5/" \t "_blank) |

## Physics

| **Application/Code** | **Description** | **Status** | **For More Information** |
| --- | --- | --- | --- |
| **BAGEL & BFM (QCD)** | Assembler kernel generation library for QCD and linear algebra operations | Ongoing | [Univ Edinburgh Intel PCC Information](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-the-higgs-center-for-theoretical-physics-the-university) |
| **Chroma QCD** | Application suite for LQCD applications | Complete | [Github Repository](https://github.com/JeffersonLab/qphix" \t "_blank)  [Main code repository](https://github.com/JeffersonLab/jlab-standard-chroma-build" \t "_blank) |
| **Elmer** | Multi-physics finite element package | Ongoing | [CSC Intel PCC Information](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-csc-it-center-for-science) |
| **Finite Difference Time Domain Method (FDTD)** | Algorithm widely used in electromagnetic simulation | Complete | [Case study](https://software.intel.com/en-us/articles/fdtd-algorithm-optimization-on-intel-xeon-phi-coprocessor?language=en) |
| **GTC-P** | Code for turbulence simulation in support of the burning plasma experiment | Complete | [Recipe/download code](https://software.intel.com/en-us/articles/gtc-p-gyrokinetic-toroidal-code-princeton-for-intel-xeon-phi-coprocessor" \t "_blank) |
| **QCDBench** | Analyzes the characteristics and behavior of elementary particles and quark | Ongoing | [Center for Computational Sciences (CCS), University of Tsukuba Intel PCC Information](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-center-for-computational-sciences-university-of-tsukuba) |
| **QphiX-QCD** | Library containing highly optimized Wilson-Dslash, Wilson Clover operator, and Krylov subspace solvers for Lattice QCD simulations | Complete | [Get Library](http://www.jlab.org/div_dept/cio/mis/openSourceSoftware.html) |

## Scientific Visualization

| **Application/Code** | **Description** | **Status** | **For More Information** |
| --- | --- | --- | --- |
| **Kitware** | VTK-based Data Analysis and Visualization Application | Complete | [TACC/Kitware](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-texas-advanced-computing-center-the-university-of-texas) |
| **VisIt** | Scientific visualization technology | Ongoing | [University of Tennessee and Oak Ridge National Laboratory](https://software.intel.com/en-us/articles/intel-parallel-computing-center-at-university-of-tennessee)  [Infomation](https://wci.llnl.gov/simulation/computer-codes/visit" \t "_blank) |