JEMS is fully written in the Java programming language and exploits the power of multi-core CPU.

It also supports the 230 crystallography space groups and atomic scattering form factors from main sources.

A crystallographic calculator simplifies crystallographic calculations of any crystal. It also supports the 320 crystallography space groups and atomic scattering form factors from main sources.

JEMS allows to calculate:
- Diffraction patterns both kinematical and dynamical:
  - SAED, CBED and LACBED,
  - Precession,
  - Powder,
  - SVD and TACBED,
- High resolution TEM:
- HADP images and maps
- SAED including Kikuchi and/or HOLZ lines
- OpenGL. It allows to transform unit cells and define large super cells and display them using OpenGL.
- HAADF images.
- HREM images are calculated using various methods.

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Jems comes in two versions:

- Student edition that can be freely downloaded and offers a limited number of predefined crystal structures.
- Full version that is licensed and can load crystal structures from several databases, ICSD, CSD, or AMS.

Both versions allow many interactive HRTEM or HRSTEM image simulations.

Many dialogues help define or load crystal structures.

Examples

**Polarity Determination**

Polarity of non-polar crystals like GaN is important for crystal growth. It can be determined experimentally by several TEM or STEM methods and in comparison to simulated electron patterns. Models can be compared with similar kinematical calculations. Models can be compared with simulated powder patterns that are calculated to patterns from X-ray or neutron diffraction.

**Utilites**

A calculator simplifies crystallographic calculations between (hkl) planes or [uvw] directions. Stereographic projections and Wulf diagrams allow easy trace analysis or HRTEM - SAED diffraction rotation alignment.

**Powder Diffraction**

Using the Debye formula, Jems simulates powder patterns that can be compared with X-ray powder data. Models with several tens of thousands atoms are simulated quickly on multi-core computers. Calculated electron powder patterns can be compared with simulated patterns from X-ray or neutron diffraction. Models can be compared with experimental data where experimental and simulated patterns are compared to patterns from X-ray or neutron diffraction.