



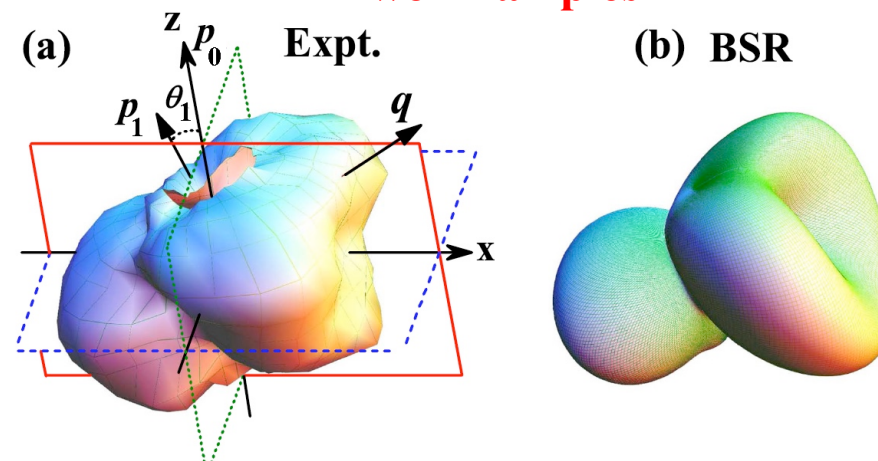
CSSI Element: A General and Effective B-Spline R-Matrix Package for Charged-Particle and Photon Collisions with Atoms, Ions, and Molecules

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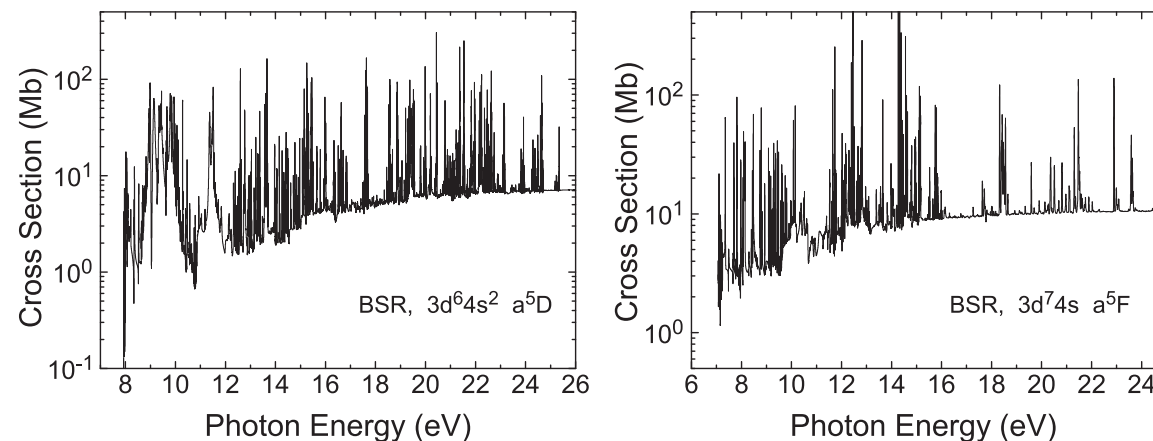
Award: OAC-1834740

- **BSR is a general program package to calculate high-quality atomic data for:**
 - structure (energy levels, oscillator strengths)
 - photoionization (bound \rightarrow free transitions)
 - electron scattering from atoms and ions
- **BSR** can be run in non-relativistic (LS), semi-relativistic (Breit-Pauli), and full-relativistic (Dirac-Coulomb) mode.
- **Data from BSR are used in:**
 - fundamental research to support many experiments
 - data-intensive modelling applications, especially in plasma and astrophysics
- The **goals of the project** are:
 - **further development** of the code (efficiency; parallelization; more physics: molecules and short-pulse, intense laser-atom interactions)
 - **simplification** of input and output to **facilitate use by non-experts**
 - creation of many **sample inputs, run scripts, and extensive documentation**
 - creation of a **website** with possibility for feedback
 - **wide and free distribution** via CPC, github, AMO Gateway, etc.

Two Examples



1) Fully-differential cross section for **(e,2e) on Ar(3p)**; Ren *et al.*, Phys. Rev. A **93** (2016) 062704; no other theory comes even close to the data.



2) **Photoionization of iron** from ground and excited states; Zatsarinny *et al.*, Phys. Rev. A **99** (2019) 023430; very complex structure