

## Shao-Ying Meng, Associate Professor—Curriculum Vitae

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### Research interests:

Theoretical research in the field of atomic, molecular, and optical physics, with the emphasis on cold atoms and molecules, quantum optics, quantum entanglement, quantum information, light-matter interactions, etc.

### Education:

- **Ph. D, Theoretical Physics**, June, 2009, Institute of Applied Physics and Computational Mathematics, China Academy of Engineering Physics, Beijing, China

Advisor: Jie Liu and Li-Bin Fu

Dissertation title “Adiabaticity and stability of the ultracold atom-molecule dark state”

Research highlights:

1. Adiabatic fidelity for atom-molecule conversion in a nonlinear three-level  $\Lambda$  – system
  - By generalizing the definition of fidelity for the nonlinear system, theoretically investigated the dynamics and adiabaticity of the population transfer for atom-molecule three-level  $\Lambda$  – system in a stimulated Raman adiabatic passage (STIRAP).
2. Linear instability and adiabatic fidelity for the dark state in a nonlinear atom-trimer conversion system
  - Theoretically investigated the linear instability and the adiabatic fidelity of a dark state in a nonlinear atom-trimer conversion that is implemented by STIRAP.
  - Based on theoretical analysis, a feasible two-photon STIRAP scheme that has high adiabatic fidelity, less instability, and therefore could yield high atom-trimer conversion efficiency is proposed.
3. Adiabatic evolution for the  $^{87}\text{Rb}$  atom–molecule conversion system
  - Theoretically investigated the adiabaticity of the STIRAP for the  $^{87}\text{Rb}$  atom–molecule conversion in a condensate system in terms of a newly defined adiabatic fidelity, in which the interparticle interactions and spontaneous emissions of the excited molecular state are included.
  - Theoretically proposed a feasible scheme to improving the conversion efficiency

through optimizing the external parameters of the STIRAP.

- **M.S. , Atomic and Molecular Physics**, June, 2006, Liaoning University, Shenyang, China

Research highlights:

- Theoretically investigated the quantum properties of the photon-added entangled coherent states
- Theoretically investigated the quantum properties Two-Mode Squeezed Even and Odd Coherent States

- **B.S. , Physics**, June, 2003 , Bohai University, Jinzhou, China

### Professional experience:

- ✧ **Liaoning University, College of Physics**, Shenyang, Liaoning, China

**Lecturer** July 2009

**Associate professor** Nov. 2011-

Research highlights:

- Theoretically investigated the instability, adiabaticity and controlling effects of external fields for the dark state in heteronuclear and homonuclear atom-tetramer conversion system.
- Theoretically investigated the dynamical instability of the dark state in the conversion of Bose-Fermi mixtures into stable molecules.
- Theoretically investigated the linear instability and adiabaticity of a dark state during conversion of two species of fermionic atoms to stable molecules.

- ✧ **Institute of Applied Physics and Computational Mathematics, China Academy of Engineering Physics**, Beijing, China

**Visiting scholar** Feb. 2014-Aug. 2014

Research highlights:

- Theoretically investigated the symmetry breaking of energy-level structures and population distribution of an atom-molecule conversion system in a double-well potential.

### Teaching experience:

Advanced Mathematics spring, 2014-2017

- This undergraduate course is the basic math course for students majoring in physics. It consists of two parts of a two-semester sequence. The first part is set in the spring semester, dividing into 7 chapters and focusing on single variable differentiation, integration and differential equations.

Advanced Mathematics fall, 2014

- This fall semester course is the second part, consisting of chapters 8 to 12 and discussing in depth multivariable differentiation, integration, infinite series, vectors and the geometry of space.

- Methods of Mathematical Physics spring, 2013
- The course is set for sophomore students majoring in physics, including complex function theory, integral transformation and mathematical and physical equations.
- Comprehensive and designing experiments in physics spring, 2012-2017
- This experimental course for juniors is taking use of the Fortran language to edit program to numerical calculation.
- Quantum scattering theory spring, 2011
- This undergraduate course for seniors mainly covers the basic definitions of collisions, potential scattering, the method of partial waves, born series, ect.

### Publications in peer reviewed journals:

1. Xi-Hao Chen, Fan-Hui Kong, Qian Fu, **Shao-Ying Meng**, and Ling-An Wu, Sub-Rayleigh resolution ghost imaging by spatial low-pass filtering, *Optics Letters*, Vol. 42, No. 24 (2017) 5290.
2. Xi-Hao Chen , Ling Yan, Wei Wu , **Shao-Ying Meng**, Ling-An Wu, Zhi-Bin Sun , Chao Wang, and Guang-Jie Zhai, Visibility enhancement in two-dimensional lensless ghost imaging, *Chin. Phys. B* Vol. 26, No. 6 (2017) 060702.
3. **Shao-Ying Meng**, Xi-Hao Chen, Shuang-Ning Ning, Jia-Mei Wen and Li-Bin Fu, “Instability, adiabaticity, and controlling effects of external fields for the dark state in a homonuclear atom tetramer conversion system”, *J. Phys. B: At. Mol. Opt. Phys.* 47 (2014) 185303.
4. **Meng Shao-Ying**, Chen Xi-Hao\*, Wu Wei, and Fu Li-Bin, “Instability, adiabaticity, and controlling effects of external fields for the dark state in a homonuclear atom tetramer conversion system”, *Chin. Phys. B* Vol. 23, No. 4, 040306 (2014).
5. Xi-Hao Chen, Shuang-Shuang Wu, Wei Wu, Wang-Yuan Guo, **Shao-Ying Meng**, Zhi-Bin Sun, Guang-Jie Zhai, Ming-Fei Li, and Ling-An Wu, “An improved algorithm to reduce noise in high-order thermal ghost imaging”, Vol. 31, No. 9 / September 2014 / *J. Opt. Soc. Am.*
6. Chen Xi-Hao, Wu Wei, **Meng Shao-Ying**, and Li Ming-Fei, “Third-order optical intensity correlation measurements of pseudo-thermal light”, *Chin. Phys. B* Vol. 23, No. 9 (2014) 090701.
7. Xi-Hao Chen, Wen Chen, **Shao-Ying Meng**, Wei Wu, Ling-An Wu, and Guang-Jie Zhai, “Role of intensity fluctuations in third-order correlation double-slit interference of thermal light”, *J. Opt. Soc. Am. A* / Vol. 30, No. 7, 1422-1425 (2013).
8. **Meng Shao-Ying**, Chen Xi-Hao , Wu Wei, and Fu Li-Bin, “Linear instability and adiabaticity of a dark state during conversion of two species of Fermionic atoms to stable molecules”, **Chin. Phys. B** Vol. 21, No. 4, 040308 (1-7), (2012).
9. **Meng Shao-Ying**, Wu Wei, Chen Xi-Hao, Zhang Jing, and Fu Li-Bin, “Dynamical instability of the dark state in conversion of Bose-Fermi mixtures into stable molecules”, **Chin. Phys. B** Vol. 20, No. 8, 080309(1-6) (2011).

10. **Shao-Ying Meng**, Li-Bin Fu, and Jie Liu, “Linear instability and adiabatic fidelity for the dark state in a nonlinear atom-trimer conversion system”, **Physical Review A** 79, 063415 (2009).
11. **Shao-Ying Meng**, Li-Bin Fu, and Jie Liu, “Adiabatic fidelity for nonlinear atom-molecule conversion systems”, **Physical Review A** 78, 053410 (2008).
12. **Shao-Ying Meng**, Li-Bin Fu, and Jie Liu, “Adiabatic evolution for  $^{87}\text{Rb}$  atom-molecule conversion system”, **J. Phys. B: At. Mol. Opt. Phys.**42 (2009).
13. **Meng Shao-Ying**, Wu Wei, Liu Bin, Ye Di-Fa, Fu Li-Bin “Dynamical instability and adiabatic evolution of atom-homonuclear-trimer dark state in a condensate system”, **Chinese Physics B**, 18(9) (2009) 3844-3849.
14. **Shao-Ying Meng**, Li-Bin Fu, and Jie Liu, “Adiabaticity of the dark state in a nonlinear atom-trimer conversion system”, **International Journal of Modern Physics C** Vol. 20, No. 7 (2009), 1011-1022.
15. **Shao-Ying Meng**, Li-Bin Fu, and Jie Liu, “Measure entanglement of bipartite system by new nonlocal effects ”, **International Journal of Modern Physics B** Vol. 21, Nos. 23 &24 (2007) 4275-4279.
16. ZHANG Jing, WU Wei, and **MENG Shao-Ying**, “Quantum Properties of Two-Mode Squeezed Even and Odd Coherent States”, **Commun. Theor. Phys.** 47 (2007) pp. 317–324.

#### Funds:

Headed over 4 research projects:

- National Natural Science Foundation of China (Grant No. 11005055),
- Ph. D. Program Foundation of the Science and Technology Bureau of Liaoning Province of China (Grant No. 20111034),
- Higher School Excellent Researcher Award Program from the the Educational Department of Liaoning Province of China (Grant No. LJQ2011005),
- Youth Fund Project of Liaoning University (Grant No. 2010LDQN17)

#### Awards and honors:

- Higher School Excellent Researcher Award of Liaoning Province 2011
- Advanced individual of Liaoning University 2011