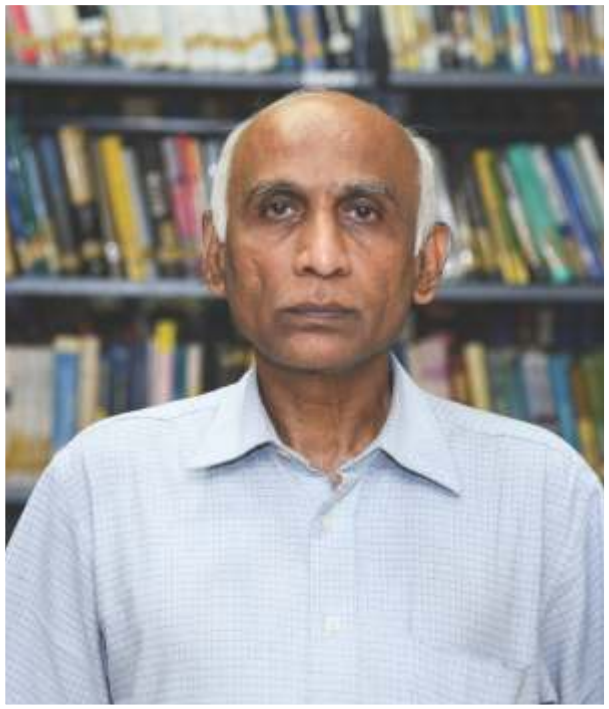

Makhtedar Sanjay Kumar

Associate Professor
Theoretical Sciences
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Guidance of Students/Post-Docs/Scientists

a) Ph.D. Students

1. Sk. Saniur Rahaman; Quantum Information in Many-Body Systems; Under progress; Manoranjan Kumar (Supervisor), M. Sanjay Kumar (Co-supervisor)
2. Prosenjit Maity; Geometric Phase in Quantum Information Science; Under progress; Dr. Malay Purkait (Supervisor), M. Sanjay Kumar (Co-supervisor)

b) Post-Docs

1. V. Yogesh; Quantum Optics and Quantum Information

Teaching

1. Autumn semester; Quantum Mechanics I; Integrated PhD; 5 students
2. Spring semester; Quantum Information Theory; Integrated PhD; 6 students
3. Spring semester; Quantum Information Theory; PhD; 4 students

Publications

a) In Journals

1. Soumyakanti Bose and **M. Sanjay Kumar**, *Analysis of necessary and sufficient conditions for quantum teleportation with non-Gaussian resources*, Physical Review A, 103, 032432, 2021

Administrative duties

1. Head, Department of Theoretical Sciences (until January, 2021)
2. Chairman, Medical Committee
3. Member, Admission Committee and Admission Coordinator
4. Member, APMP
5. Member, SCRE

Areas of Research

Quantum Optics and Quantum Information
Work with Prosenjit Maity, external student from RKM College, Narendrapur

Our recent work has focussed on designing schemes for building geometric phase based 3 qubit gates using Rydberg atoms in cavities. In this context, a theoretical problem we encountered was how to derive effective Hamiltonians for multiphoton processes for atoms in cavities in nonresonant situations. Earlier approaches in the literature worked only in resonant situations. We have formulated a method of deriving effective Hamiltonians for multiphoton processes for atoms in cavities that works well in general situations.

Plan of Future Work Including Project

1. Further studies of geometric phase in quantum information