CV

Name of the applicant: **Saleh Hasan Naqib**

Date of Birth: 3rd August 1970

Nationality: Bangladeshi

Present position: **Professor**, Department of Physics, Rajshahi University, Bangladesh

Academic qualifications:

Degree	University	Result
Ph.D. in Physics	University of Cambridge, UK	Degree conferred on the 19th of July 2003
	[*Southern Illinois University in Carbondale (SIUC), USA	GPA for the Spring term: 4.0 (1998)]
M.Sc. in Physics (Condensed Matter Physics group)	Rajshahi University, Bangladesh	1st Class, First position (1997)
B.Sc. in Physics	Rajshahi University, Bangladesh	1st Class, First position (1995)

Ph.D. thesis title: ***An Experimental Study of the Effects of Hole Content and Disorder on the Pseudogap of the High-T_c Superconductor $Y_{1-x}Ca_xBa_2(Cu_{1-y}Zn_y)_3O_{7-\delta}$***

****CPGS thesis title:** ***Low Field AC Susceptibility and Critical Currents of Optimally Doped YBCO Single Crystal***

M.Sc. thesis title: ***Copper Oxide Superconductors in the Generalized Phonon-Plasmon Mechanism***

*Went to Southern Illinois University in Carbondale (SIUC), USA, with a research assistantship as a graduate student in Physics in January 1998. Studied there for the Spring-term before getting the Commonwealth Scholarship for Ph.D. in University of Cambridge, UK (from October 1998).

**CPGS (Certificate of Postgraduate Study) thesis was based on the first year research as a Ph.D. student in Physics in University of Cambridge, UK.

Fields in which specially qualified:

Condensed Matter Physics (experimental and theoretical), High-Temperature Superconductivity, Density Functional Theory, Materials Science, Statistical Mechanics, Quantum Mechanics, Photovoltaics, Physics Teaching-Learning (Pedagogy), and Science Education in general.

Awards/Scholarships:

1. **ICTP postgraduate scholarship** for one year for the advanced course in theoretical Physics in ICTP, Italy **from September 1997**.
2. **Research assistantship** in Physics at **SIUC, USA (from January 1998)**.
3. The **Commonwealth Scholarship for Ph.D.** in Physics at University of Cambridge, UK **(October 1998 – February 2002)**.
4. **Scholarships/Studentships from Physics Department, Cambridge Philosophical Society, and Darwin College, University of Cambridge, Lundgren Research Grant, for the period of March 2002 – March 2003**.
5. **Bangladesh Academy of Sciences (BAS) Gold Medal as the Junior Scientist of the Year 2007 (Physical Sciences Category)**.
6. The World Academy of Science (**TWAS, ICTP, ITALY) Award as the Young Scientist of the Year 2008 from Bangladesh in the Physical Sciences Category**.
7. **Regular Associate membership from the AS-ICTP, Italy, for the period Jan 2009 – Dec 2015**.
8. **Razzaq-Shamsun Physics Research Award for the best Physics paper published from Bangladesh in the year 2006 (awarded in 2011)**.
9. **S N Nahar Physics Research Award as the best researcher at Department of Physics, University of Rajshahi, for the year 2014.**
10. **S N Nahar Physics Teacher of the Year Award as the best teacher selected by the students of Department of Physics, University of Rajshahi, for the year 2015.**
11. **S N Nahar Physics Research Award as the best researcher at Department of Physics, University of Rajshahi, for the year 2016.**
12. **S N Nahar Physics Teacher of the Year Award as the best teacher selected by the students of Department of Physics, University of Rajshahi, for the year 2017.**
13. **Dean's Award 2018 in research from the Faculty of Science, University of Rajshahi, as the best researcher in the Physical and Mathematical Sciences Category.**
14. **Bangladesh Academy of Sciences (BAS) Gold Medal as the Senior Scientist for the Year 2016 (Physical Sciences Category)**.
15. **Elected Fellow of the Bangladesh Academy of Sciences,** the apex body for the scientists in Bangladesh. Membership is for life.
16. **Elected Fellow of the World Academy of Sciences (TWAS), Italy for the Year 2022**. TWAS is a merit-based science academy, representing the best of science in developing countries. The main criterion for election as a TWAS Member is scientific excellence. Only those scientists who have attained the highest international standards and have made significant contributions to the advancement of science can be nominated as Fellows. Membership is for life.
17. **Elected Fellow of the Bangladesh Physical Society (BPS) 2023**. Fellowship is for life.
18. **Dean's Award 2021 (for the second time) in research from the Faculty of Science, University of Rajshahi, as the best researcher in the Physical and Mathematical Sciences Category (awarded in 2023).**

Teaching/Research experiences:

1. Worked as an **M.Sc. research student** with Prof. A.K.M Azharul Islam, Department of Physics, **Rajshahi University, Bangladesh,** on theoretical aspects of high-T_c superconductors during the period of **1996-1997**.
2. Worked on the theory of Colossal Magneto Resistivity (CMR), as the **Research Assistant** of Prof. F.B. Malik in **SIUC, USA** for the **spring term 1998**.
3. Joined as a **Lecturer in Physics**, **University of Rajshahi, Bangladesh**, on **1 June 1998**. Taught Mathematical Methods in Physics to undergraduate and graduate students and also took part in developing the graduate Solid State Physics course.
4. **Supervised third year undergraduates in Physics at University of Cambridge for the Solid State Physics course (2001).**
5. **In each year from 2000 to 2002, worked as a demonstrator in the Optics lab for the second year undergraduate students in University of Cambridge, UK**.
6. Worked as a **Ph.D. student** of Prof. J.R. Cooper on the transport and magnetic properties of Ca and Zn substituted Y123 superconductors at **University of Cambridge, UK**, **from October 1998 to March 2003**.
7. Worked as a **Postdoctoral Researcher** with Prof. J.R. Cooper on magneto-transport properties of Zn and Ca substituted c-axis oriented crystalline thin films of Y123 at **University of Cambridge, UK,** from **June 2003 to September 2003**.
8. Worked as a **Postdoctoral Researcher** with Prof. J.L. Tallon at the **MacDiarmid Institute for Advanced Materials and Nanotechnology, at Victoria University of Wellington, New Zealand**, from **September 2003 to June 2004** on Raman scattering, Infrared study, magnetic properties, and critical currents of high-T_c superconductors as a function of hole concentration and disorder contents.
9. Worked as a **Postdoctoral Research Associate** with Prof. J.R. Cooper from **July 2004 to May 2005** at the IRC in Superconductivity and the Quantum Matter group, **University of Cambridge, UK**. The research involved magneto-transport measurements on isotope substituted high-T_c superconductors. These studies yielded valuable information regarding the origin and the doping dependence of the so-called "pseudogap phase" of the cuprate superconductors. The origin of the pseudogap is believed to be an outstanding problem in the physics of high-T_c superconductors.
10. Rejoined the Department of Physics, **Rajshahi University, Bangladesh**. From the 23rd of May, 2005, worked as an **Assistant Professor** **(effective since June 2001) in the Department till the 21st of March 2007.**
11. Visited the **Quantum Matter Group, Department of Physics, University of Cambridge as an Invited Scholar for the period 1 June 2006 to 31 July 2006**. During this time I have done research on the effects of non-magnetic impurities in cuprates and the Nernst effect.
12. Promoted to the post of **Associate Professorship** on the 21st of March, 2007, and served in this position till November 2011.
13. Invited as a **Visiting Scholar**, by **Quantum Matter Group, Department of Physics, University of Cambridge, UK, for the period June-July 2007.** I have conducted research on magneto-transport properties of cuprates at the **Cavendish Laboratory** during this period.

14. Invited as **Visiting Scholar** by **Quantum Matter Group, Department of Physics, University of Cambridge, UK, for the period October-November 2008** to investigate the electronic and magnetic properties of the recently discovered FeAs-based superconductors.
15. Invited as **Visiting Scholar** by **Quantum Matter Group, Department of Physics, University of Cambridge, UK, for the period April-May 2010** to investigate the superfluid density of very underdoped Y123 superconductors.
16. Visited the **AS-ICTP, Trieste, Italy, as a Regular Associate for the period April-May 2011** to conduct research on disordered strongly correlated electronic systems.
17. **Since November 2011, working as a Professor in the Department**. Duties involve teaching undergraduate and graduate students, supervising graduate students, and conducting research on various magneto-transport properties of High-T_c cuprates and other condensed phases. I am also playing a significant role in curriculum development. As an active collaborator, I keep close contacts with the Quantum Matter group at University of Cambridge, UK.
18. Visited the **AS-ICTP, Trieste, Italy, as a Regular Associate for the period May-July 2012** and conducted research on superconducting pairing and flux dynamics related issues in high-T_c cuprates.
19. Visited the **AS-ICTP, Trieste, Italy, as a Regular Associate for the period May-July 2014** and conducted research on pseudogap phenomenon in high-T_c cuprates.
20. Visited the **AS-ICTP, Trieste, Italy, as a Regular Associate for the period June-August 2015** and conducted research on in- and out-of-plane charge transport in quasi-2D hole doped cuprates.

Proficiency in English:

TOEFL Score: 630 (1996)
IELTS Score: 8.0 (1998)

List of published papers in international journals (* denotes corresponding authorship):

168. An inclusive study of lead-free perovskite $CsMI_3$ materials for photovoltaic and optoelectronic appliance explored by a first principles study
*M. Biswas, M.A. Ali, M. M. Hossain, **S.H. Naqib**, S. Ghosh, J. Chowdhury, M.M. Uddin*
Materials Today Communications (2024).
https://doi.org/10.1016/j.mtcomm.2024.109422

167. Pressure dependent physical properties of a potential high-T_C superconductor $ScYH_6$: insights from first-principles study
*Md Ashraful Alam, F. Parvin, **S.H. Naqib****
Solid State Sciences (2024).
https://doi.org/10.1016/j.solidstatesciences.2024.107551

166. Insights into the unrevealed physical properties of $Sc_2Al_2C_3$ compared with other Sc-Al-C systems via ab-initio investigation
*M.A. Rayhan, M.A. Ali, N. Jahan, M.M. Hossain, M.M. Uddin, A.K.M.A. Islam, **S.H. Naqib***
Physics Open (2024). https://doi.org/10.1016/j.physo.2024.100217

165. A comparative *ab-initio* investigation of the physical properties of cubic Laves phase compounds $X$$Bi_2$ (X = K, Rb)
*Jahid Hassan, M. A. Masum, **S. H. Naqib***
Computational Condensed Matter (2024).
https://doi.org/10.1016/j.cocom.2024.e00905

164. DFT insights into *i*-MAB phase, $Mo_4Y_2Al_3B_6$: a potential thermal barrier coating and solar heat reducing material
*S. Islam, M.R. Rana, Prima Das, K. Hoque, **S.H. Naqib**, M.A. Ali*
Physica Scripta (2024). DOI 10.1088/1402-4896/ad3d90

163. Effects of S substitution on the structural, optoelectronic, and thermomechanical properties of $KTaO_3$ through density functional theory
*H. Akter, M. M. Hossain, M. M. Uddin, **S. H. Naqib**, M. A. Ali*
Journal of Physics and Chemistry of Solids (2024).
https://doi.org/10.1016/j.jpcs.2024.112021

162. Ab-initio insights into the physical properties of $X$$Ir_3$ (X = La, Th) superconductors: A comparative analysis
*Md. Sajidul Islam, Razu Ahmed, M.M. Hossain, M.A. Ali, M.M. Uddin, **S.H. Naqib***
Results in Materials (2024). https://doi.org/10.1016/j.rinma.2024.100568

161. Oxysulfide Perovskites: Reduction of the Electronic Band Gap of $RbTaO_3$ by Sulfur Substitution
*H. Akter, M.A. Ali, M.M. Hossain, M.M. Uddin, **S.H. Naqib***
Physica Scripta (2024). DOI 10.1088/1402-4896/ad31f3

160. First-principles pressure dependent investigation of the physical properties of KB_2H_8: a prospective high-T_C superconductor
*Md. Ashraful Alam, F. Parvin, **S.H. Naqib***
Results in Physics (2024). https://doi.org/10.1016/j.rinp.2024.107498

159. Theoretical studies on phase stability, electronic, optical, mechanical and thermal properties of chalcopyrite semiconductors $HgXN_2$ (X = Si, Ge and Sn): a comprehensive DFT analysis
*A. Hossain, M.M. Hossain, M. A. Ali, M.M. Uddin, **S.H. Naqib***
Materials Science in Semiconductor Processing **172** (2024) 108092.

158. A comprehensive first-principles insights into the physical properties of binary intermetallic Zr_3Ir compound
*Razu Ahmed, Md. Sajidul Islam, M.M. Hossain, M.A. Ali, M.M. Uddin, **S.H. Naqib***
Results in Materials (2024). https://doi.org/10.1016/j.rinma.2023.100518

157. Ab-initio insights into the structural, elastic, bonding, and thermophysical properties of UH_x (x = 1, 2, 3, 5, 6, 7, 8) under pressure: possible relevance to high-T_c superconductivity
*Md. Ashraful Alam, F. Parvin, **S.H. Naqib***
Results in Materials 21 (2024) 100500.

156. A comparative study of the physical properties of layered transition metal nitride halides MNCl (M = Zr, Hf): DFT based insights
*Shaher Azad, B. Rahman Rano, Ishtiaque M. Syed, **S.H. Naqib***
Physica Scripta (2023). https://doi.org/10.1088/1402-4896/ad04a2

155. Ab-initio investigation of the physical properties of BaAgAs Dirac semimetal and its possible thermo-mechanical and optoelectronic applications
*A.S.M. Muhasin Reza, **S.H. Naqib***
Physica B (2023). https://doi.org/10.1016/j.physb.2023.415425

154. Structural, elastic, electronic, bonding, thermo-mechanical and optical properties of predicted NbAlB MAB phase in comparison to MoAlB: DFT based ab-initio insights
*Mst. Bina Aktar, F. Parvin, A.K.M. Azharul Islam, **S.H. Naqib***
Results in Physics (2023). https://doi.org/10.1016/j.rinp.2023.106921

153. A comprehensive exploration of the physical properties of M_2GaB (M = Ti, Zr, Mo, Hf) through DFT method
*S. Islam, M.R. Rana, K. Hoque, G.G. Biswas, M.E. Hossain, M.M. Uddin, **S.H. Naqib**, M. A. Ali*
Results in Materials (2023). https://doi.org/10.1016/j.rinma.2023.100438

152. DFT insights into MAX phase borides Hf_2AB [A = S, Se, Te] in comparison with MAX phase carbides Hf_2AC [A = S, Se, Te]
*J. Islam, M.D. Islam, M.A. Ali, H. Akter, A. Hossain, M. Biswas, M.M. Hossain, M.M. Uddin, **S.H. Naqib****
ACS Omega (2023). https://doi.org/10.1021/acsomega.3c04283

151. DFT approach into the physical properties of MTe_3 (M = Hf, Zr) superconductors: a comprehensive study
*F. Rahman, M.M. Ali, M.A. Ali, M.M. Uddin, **S.H. Naqib**, M. M. Hossain*
AIP Advances (2023). https://doi.org/10.1063/5.0160012

150. A BRIEF OVERVIEW TO THE ELECTRONIC BAND STRUCTURES OF NICKELATES AND CUPRATES IN THE GROUND STATE
*Md. Enamul Haque, Ayesha Siddika Borna, **S.H. Naqib****
Bangladesh Journal of Physics 28-29, **1-11** (2021-2022) (Invited Review Article).

149. DFT based investigation of bulk mechanical, thermophysical and optoelectronic properties of $PbTaSe_2$ topological semimetal
*A.S.M. Muhasin Reza, **S.H. Naqib****
Computational Condensed Matter (2023).
https://doi.org/10.1016/j.cocom.2023.e00833

148. A comprehensive ab-initio insights into the pressure dependent mechanical, phonon, bonding, electronic, optical, and thermal properties of CsV_3Sb_5 Kagome compound
*M.I. Naher, M.A. Ali, M.M. Hossain, M.M. Uddin, **S.H. Naqib****
Results in Physics (2023). https://doi.org/10.1016/j.rinp.2023.106742

147. Optical Response, Lithium Doping, and Charge Transfer in Sn-Based 312 MAX Phases
*M.A. Hadi, Nicolas Kelaidis, Stavros-Richard G. Christopoulos, Alexander Chroneos, **S.H. Naqib**, A.K.M. Azharul Islam*
ACS Omega (2023). https://doi.org/10.1021/acsomega.3c03645

146. First principles study of mechanical, thermal, electronic, optical and superconducting properties of C40-typegermanide-based MGe_2 (M = V, Nb and Ta)

M.H. Kabir, M.M. Hossain, M.A. Ali, M.M. Uddin, M.L. Ali, M.Z. Hasan, A.K.M.A. Islam, ***S.H. Naqib****

Results in Physics (2023). https://doi.org/10.1016/j.rinp.2023.106701

145. Impact of M atomic species on physical properties of M_2TlC (M = Ti, Zr, Hf): a first principles calculation

M. Sohel, M.M. Uddin, Md. Ashraf Ali, Md. Mukter Hossain, A.K.M.A. Islam, ***S.H. Naqib***

AIP Advances (2023). https://doi.org/10.1063/5.0150252

144. Ab-initio study of pressure dependent physical properties and possible high-T_c superconductivity in monoclinic and orthorhombic $MgVH_6$

Md. Ashraful Alam, F. Parvin, ***S.H. Naqib****

Physica B (2023). https://doi.org/10.1016/j.physb.2023.414978

143. DFT prediction of the stability and physical properties of M_2GaB (M = Sc, V, Nb, Ta)

M.R. Rana, S. Islam, K. Hoque, G.G. Biswas, M.E. Hossain, ***S.H. Naqib****, M.A. Ali*

Journal of Materials Research and Technology (2023).
https://doi.org/10.1016/j.jmrt.2023.05.008

142. DFT based comparative analysis of the physical properties of some binary transition metal carbides XC (X = Nb, Ta, Ti)

Razu Ahmed, Md. Mahamudujjaman, Md. Asif Afzal, Md. Sajidul Islam, R.S. Islam, ***S.H. Naqib****

Journal of Materials Research and Technology (2023).
https://doi.org/10.1016/j.jmrt.2023.04.147

141. Interrelations among zero-field critical current density, irreversibility field and pseudogap in hole doped high-T_c cuprates

S.H. Naqib*, R.S. Islam*

Physica C (2023). https://doi.org/10.1016/j.physc.2023.1354255

140. Pressure-dependent semiconductor-metal transition and elastic, electronic, optical, and thermophysical properties of orthorhombic SnS binary chalcogenide

Ayesha Tasnim, Md. Mahamudujjaman, Md. Asif Afzal, R.S. Islam, ***S.H. Naqib****

Results in Physics (2023). https://doi.org/10.1016/j.rinp.2023.106236

139. A comparative study of the structural, elastic, thermophysical, and optoelectronic properties of $CaZn_2X_2$ (X = N, P, As) semiconductors via *ab-initio* approach

Md. Sajidul Islam, Razu Ahmed, Md. Mahamudujjaman, R.S. Islam, ***S.H. Naqib****

Results in Physics (2023). https://doi.org/10.1016/j.rinp.2023.106214

138. The rise of 212 MAX phase borides, Ti_2PB_2, Zr_2PbB_2, and Nb_2AB_2 [A = P, S]: DFT insights into the physical properties for thermo-mechanical applications

M.A. Ali, M.M. Hossain, M.M. Uddin, A.K.M.A. Islam, ***S.H. Naqib****

ACS Omega (2022). https://doi.org/10.1021/acsomega.2c06331

137. Metallic boro-carbides of A_2BC (A = Ti, Zr, Hf and W): A comprehensive theoretical study for thermo-mechanical and optoelectronic applications

R. Islam, M.M. Hossain, M.A. Ali, M.M. Uddin, ***S.H. Naqib***

RSC Advances (2022). DOI: 10.1039/D2RA05448E

136. Exploration of physical properties of newly synthesized Kagome superconductor $LaIr_3Ga_2$ using different exchange correlation functionals

J. Islam, S.K. Mitro, M.M. Hossain, M.M. Uddin, N. Jahan, A.K.M.A. Islam, ***S.H. Naqib****, M. A. Ali*
Physical Chemistry Chemical Physics (2022).
https://doi.org/10.1039/D2CP04054A

135. A comparative DFT exploration on M- and A-site double transition metal MAX phase, Ti_3ZnC_2
M.A. Hadi, Istiak Ahmed, M.A. Ali, M.M. Hossain, M.T. Nasir, M.L. Ali, ***S.H. Naqib****, A.K.M.A. Islam*
Open Ceramics (2022). https://doi.org/10.1016/j.oceram.2022.100308

134. An ab initio approach to understand the structural, thermophysical, electronic, and optical properties of binary silicide $SrSi_2$: A double Weyl semimetal
Suptajoy Barua, B. Rahman Rano, Ishtiaque M. Syed, ***S.H. Naqib****
Results in Physics (2022).
https://doi.org/10.1016/j.rinp.2022.105973

133. DFT insights into the electronic structure, mechanical behaviour, lattice dynamics and defect processes in the first Sc-based MAX phase Sc_2SnC
M.A. Hadi, S.-R.G. Christopoulos, A. Chroneos, ***S.H. Naqib****, A.K.M.A. Islam*
Scientific Reports (2022). https://doi.org/10.1038/s41598-022-18336-z

132. *Ab initio* study of the pressure dependence of mechanical and thermodynamic properties of GeB_2O_4 (*B* = Mg, Zn and Cd) spinel crystals
F. Zerarga, D. Allali, A. Bouhemadou, R. Khenata, B. Deghfel, S. Saad Essaoud, R. Ahmed, Y. Al-Douri, S.S. Safaai, S. Bin-Omran, ***S.H. Naqib***
Computational Condensed Matter (2022).
https://doi.org/10.1016/j.cocom.2022.e00705

131. *Ab-initio* insights into the elastic, bonding, phonon, optoelectronic and thermophysical properties of $SnTaS_2$
M.I. Naher, M. Mahamudujjaman, A. Tasnim, R.S. Islam, ***S.H. Naqib****
Solid State Sciences (2022).
https://doi.org/10.1016/j.solidstatesciences.2022.106947

130. Possible applications of Mo_2C in the orthorhombic and hexagonal phases explored via ab-initio investigations of elastic, bonding, optoelectronic and thermophysical properties
M.I. Naher, ***S.H. Naqib****
Results in Physics (2022). https://doi.org/10.1016/j.rinp.2022.105505

129. First-principles insights into the mechanical, optoelectronic, thermophysical, and lattice dynamical properties of binary topological semimetal $BaGa_2$
M.I. Naher, ***S.H. Naqib****
Results in Physics (2022). https://doi.org/10.1016/j.rinp.2022.105507

128. Optical response, lithiation and charge transfer in Sn-based 211 MAX phases with electron localization function
M.A. Hadi, N. Kelaidis, A. Chroneos, ***S.H. Naqib****, A.K.M.A. Islam*
Journal of Materials Research and Technology (2022).
https://doi.org/10.1016/j.jmrt.2022.03.083

127. Magnetic Field and Frequency Dependent Study of the AC Susceptibility of High-T_c YBCO Single Crystal
M. Rakibul Hasan Sarkar, ***S.H. Naqib****

Journal of Superconductivity and Novel Magnetism (2022). https://doi.org/10.1007/s10948-022-06167-y

126. First-principles insights into mechanical, optoelectronic, and thermo-physical properties of transition metal dichalcogenides ZrX_2 (X = S, Se, Te)
Md. Mahamudujjaman, Md. Asif Afzal, R.S. Islam, ***S.H. Naqib****
AIP Advances **12**, 025011 (2022); https://doi.org/10.1063/5.0073631

125. First-principles prediction of pressure dependent mechanical, electronic, optical, and superconducting state properties of NaC_6: A potential high-T_c superconductor
Nazmun Sadat Khan, B. Rahman Rano, Ishtiaque M. Syed, R.S. Islam, ***S.H. Naqib****
Results in Physics (2022). https://doi.org/10.1016/j.rinp.2022.105182

124. Newly synthesized 3D boron-rich chalcogenides $B_{12}X$ (X = S, Se): Theoretical characterization of physical properties for optoelectronic and mechanical applications
M.M. Hossain, M.A. Ali, M.M. Uddin, ***S.H. Naqib****, A.K.M.A. Islam*
ACS Omega (2021). DOI: 10.1021/acsomega.1c05172

123. A density functional theory approach to the effects of C and N substitution at the B-site of the first boride MAX phase Nb_2SB
M.A. Hadi, Zahanggir Alam, Istiak Ahmed, A.M.M. Tanveer Karim, ***S.H. Naqib****, A. Chroneos, A.K.M.A. Islam*
Materials Today Communications (2021). DOI: 10.1016/j.mtcomm.2021.102910

122. A first-principles prediction of thermophysical and thermoelectric performances of $SrCeO_3$ perovskite
Preeti Kumari, Vipul Srivastaba, Rabah Khenata, Sajad Ahmad Dar, ***S.H. Naqib***
International Journal of Energy Research (2021). DOI: 10.1002/er.7354

121. Understanding the improvement of thermo-mechanical and optical properties of 212 MAX phase borides Zr_2AB_2 (A = In, Tl)
M.A. Ali, M.M. Hossain, M.M. Uddin, A.K.M.A. Islam, ***S.H. Naqib****
Journal of Materials Research and Technology (2021). https://doi.org/10.1016/j.jmrt.2021.09.042

120. Hole content dependent fluctuation diamagnetism in $YBa_2Cu_3O_{7-\delta}$: possible role of the pseudogap
Ayesha Siddika Borna, R.S. Islam, ***S.H. Naqib****
Journal of Superconductivity and Novel Magnetism (2021). https://link.springer.com/article/10.1007/s10948-021-06035-1

119. A comprehensive study of the thermophysical and optoelectronic properties of Nb_2P_5 via *ab-initio* technique
M.I. Naher, ***S.H. Naqib****
Results in Physics (2021). https://doi.org/10.1016/j.rinp.2021.104623

118. A comprehensive DFT based insights into the physical properties of tetragonal superconducting Mo_5PB_2
M.I. Naher, M.A. Afzal, ***S.H. Naqib****
Results in Physics (2021). https://doi.org/10.1016/j.rinp.2021.104612

117. Structural, electronic, magnetic and mechanical properties of the full-Heusler compounds Ni_2Mn(Ge, Sn) and Mn_2NiGe

*N. Asli, F. Dahmane, Mohamed Mokhtari, C. Zouaneb, M. Batouche, H. Khachai, V. Srivastava, **S.H. Naqib**, Y. Al-Douri, A. Bouhemadou, R. Khenata*
Zeitschrift für Naturforschung A (ZNA) (2021).
https://www.degruyter.com/document/doi/10.1515/zna-2020-0329/html

116. Origin of high hardness and optoelectronic and thermo-physical properties of boron-rich compounds B_6X (X = S, Se): a comprehensive study via DFT approach
*M.M. Hossain, M.A. Ali, M.M. Uddin, A.K.M.A. Islam, **S.H. Naqib***
Journal of Applied Physics (2021).
https://aip.scitation.org/doi/pdf/10.1063/5.0047139

115. A comparative study of structural, thermal, and optoelectronic properties between zircon and scheelite type structures in $SrMoO_4$ compound: An ab-initio study
*M. Benzineb, F. Chiker, H. Khachai, H. Meradji, S. Uğur, **S.H. Naqib***, *S. Bin Omran, Xiaotian Wang, R. Khenata*
Optik (2021). https://doi.org/10.1016/j.ijleo.2021.166714

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*Mohamed Amine Ghebouli, Brahim Ghebouli, Tayeb Chihi, Messaoud Fatmi, Rabah Khenata, **S.H. Naqib***
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Invited and Peer Reviewed Book Chapter Contributions:

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Presentations:

1. *Van Hove scenario, lattice gas phenomenology, and the complex structure of doping dependence of dT_c/dp of Y123*
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(Presented at International Conference on Magnetism and Advanced Materials (ICMAM 2010), 3 – 7 March, 2010, Dhaka, Bangladesh).
18. *Quantum criticality and strongly correlated electronic materials*
(Presented at International Conference on Physics of Today, 15-16 March, 2012, Dhaka, Bangladesh).
19. *On superconducting fluctuations in high-T_c cuprates*
(Presented at Department of Physics, University of Chittagong, Bangladesh, 13 May, 2013).
20. *Doping and disorder dependent isotope exponent in hole doped cuprates*
(**Keynote presentation** at International Conference on Advances in Physics (ICAP) 2015, 18-19 April, 2015, Rajshahi, Bangladesh).
21. *Weyl Fermions and related topics*
(Presented at Department of Physics, University of Rajshahi, Bangladesh, 26 August, 2015).
22. *Hydrides to cuprates – road towards room temperature superconductivity*
(Presented at Department of Physics, University of Rajshahi, Bangladesh, 04 February, 2016).
23. *Enhanced high temperature conductivity in superconducting cuprates: pairing versus non-pairing correlations*
(**Invited presentation** at International Conference on Physics 2016, Organized by the Bangladesh Physical Society, 10-12 March, 2016, Dhaka, Bangladesh).
24. *In-plane resistivity of hole doped cuprates: role of pseudogap and quantum criticality*
(**Invited talk** presented at National Conference on Physics – 2017, 5 – 7 January 2017, Dhaka, Bangladesh).
25. *Superconductivity in the presence of multiple orders*
(**Invited talk** presented in the 15th Chittagong Conference on Mathematical Physics 2017, 16 March 2017, Chittagong, Bangladesh).
26. *Effect of multiple orders on the superconducting transition temperature of hole doped cuprates*
(Presented at the International Conference on Materials Science and Nano-electrochemistry, 8-9 April 2017, University of Rajshahi, Bangladesh).
27. *Physics: teaching – learning*

(**Keynote speech**, Department of Physics, Dhaka University, Bangladesh, at the workshop entitled *Teaching Methodology, Assessment Methods and Pedagogy*, November 5, 2017).

28. *Pair-breaking, pseudogap, and superconducting T_c of hole doped cuprates: role of superfluid density*
(**Invited presentation** at the 2nd International Conference on *Physics for Sustainable Development & Technology* ICPSDT-2017, December 11-12, Chittagong, Bangladesh).
29. *Superconductivity - where the electrons pair*
(**Keynote speech**, Department of Physics, Mawlana Bhashani Science and Technology University, Bangladesh, at the workshop entitled *Research and Academic Career in Physics*, January 20, 2018).
30. *Disorder induced low-energy quasiparticle states in hole doped cuprates: relevance to magnetic effect and T_c degradation*
(**Invited presentation** at the *International Conference on Recent Advances in Mathematical and Physical Sciences (ICRAMPS 2018)*, Jahangirnagar University, Bangladesh, 27 – 29 January, 2018).
31. *Superconductivity – a tale of paired electrons*
(**Invited presentation** at the *Bose Symposium – Satyen Bose and the World of Bosons*, University of Dhaka, Bangladesh, 24 February, 2018).
32. *Anomalous Magnetism and T_c Degradation in Disordered Hole Doped Cuprates: a Unified Description*
(**Invited presentation** at the *International Conference on Physics* University of Dhaka, Bangladesh, 08 – 10 March, 2018).
33. *Philosophical Foundations of Scientific Research*
(**Invited presentation** at the Workshop arranged by Space and Environment Research Center, Rajshahi University, 02 August, 2019).
34. *Superconductivity in a nutshell*
(**Invited lecture** at Department of Physics, Bangladesh University of Engineering and Technology, Bangladesh, 24 August, 2019).
35. *A simple approach to calculate the superpair density in high-T_c cuprate superconductors and its relevance to the critical current density*
(**Invited presentation** at the 4th Young Scientist Congress 2019, Bangladesh Academy of Sciences, Dhaka, Bangladesh, 13 – 15 December, 2019).
36. *Superpair density, pseudogap, and critical current density in high-T_c cuprate superconductors: interrelations and implications*
(**Invited presentation** at the International Conference on Physics 2020, Dhaka, Bangladesh, 5 – 7 March, 2020).
37. *An Introduction to the Assumptions in Statistical Mechanics*
(**Invited presentation** in the International Webinar arranged by Department of Physics, Pabna University of Science and Technology, Bangladesh, 21 June, 2020).
38. *Research Ethics and Some Related Aspects*
(**Invited presentation** at the Workshop arranged by Space and Environment Research Center, Rajshahi University, 29 August, 2020).
39. *A Sneak Peek into the Black Holes*

(**Invited presentation** in the Webinar arranged by Department of Physics, Pabna University of Science and Technology, Bangladesh, 14 October, 2020).

40. *A Critical Discussion on the Origin and Development of Experimental Science: Encounter with the Modern West*
(**Keynote speech** in the Symposium on Professor Muin ud-din Ahmad Khan's Origin and Development of Experimental Science: Encounter with the Modern West, Chittagong, Bangladesh, 19 December, 2020).
41. *Pseudogap in hole doped cuprates: role of the other gap in copper oxide high-T_c superconductors*
(**Plenary lecture** in International e-Conference on Physics-2021, held by Bangladesh Physical Society (BPS), University of Dhaka, and Frontiers of Physics of US + Bangladesh Collaboration, Date: 5 – 7 February 2021).
42. *Bosons in high-T_c cuprates: where do we stand?*
(**Invited speech** in International e-Conference on Physics 2021, 9 – 11 July 2021, University of Dhaka, Bangladesh).
43. *Road to room temperature superconductivity: A progress report*
(**Academy Lecture**, arranged by Bangladesh Academy of Sciences (BAS), 10 January 2022).
44. *50 Years of Research in Bangladesh: Insights from the SCOPUS Database*
(**Keynote speech**, Arranged by Scientific Bangladesh, 15 January 2022).
45. *Superpair Density and Critical Current in Hole Doped Cuprates: Robustness of Intrinsic Effects*
(**Keynote speech** in International Conference on Materials for Emerging Technologies-2021 (ICMET-21), Organized by Department of Research Impact & Outcome, Division of Research & Development, Lovely Professional University (LPU), Punjab, India, 18 February 2022).
46. *Fluctuation diamagnetism in Y123: implications on the origin of the normal state pseudogap*
(**Invited speech** in International Conference on Physics 2022, Arranged by Bangladesh Physical Society (BPS), 19 – 21 May 2022, Dhaka, Bangladesh).
47. *James Webb Space Telescope: a view to the early universe*
(**Plenary lecture**, University of Rajshahi, 31 August 2022).
48. *Observing the Universe: From Antiquity to the James Webb Space Telescope*
(**Bangladesh Academy of Sciences Lecture**, Dhaka University, 26 October 2022).
49. *Interrelations among Critical Current Density, Irreversibility Field, and Pseudogap in Hole Doped High-T_c Cuprates*
(Presented at the International Forum on Applied Superconductivity and Magnetism IFASM 2022, 6 – 8 December 2022, Gold Coast, Australia).
50. *Overdoping, magnetic effects and degradation of the superconducting T_c in Ca-substituted YBCO*
(**Invited speech** in National Conference on Physics 2023, Arranged by Bangladesh Physical Society (BPS), 9-11 March 2023, Jahangirnagar University, Dhaka, Bangladesh).
51. *The case of missing electronic entropy and the magnetic susceptibility of high-T_c cuprates*

(**Invited speech** in 5th International conference on "Physics for Sustainable Development & Technology (ICPSDT-2023)", 7-8 September, 2023, CUET, Bangladesh).

52. *Topological Features in a Kagome Metal (CsV_3Sb_5) and its Fermi Surface Evolution under Pressure*
(**Plenary speech** in Sultan Ahmed Memorial Conference: Recent Advances in Physics 2024, Arranged by Department of Physics, University of Dhaka, Bangladesh, 3 – 4 May 2022, Dhaka, Bangladesh).
53. *Critical Current Density of Hole Doped High-T_c Superconductors: Robustness of the Intrinsic Effects*
(**Invited speech** in International Conference on Physics 2024, Arranged by Bangladesh Physical Society (BPS), 9-11 May 2024, Dhaka, Bangladesh).

Conference/Workshop attended and courses taken:

1. *International Workshop on Recent Development in Condensed Matter Physics and Nuclear Science*
Rajshahi University (28 Oct. - 1 Nov., 1996), Bangladesh.
2. *Low-temperature technique course*
Institute of Physics (IOP), Birmingham, November 1998, UK.
3. *Winter School on Superconductivity*
University of Cambridge, January 1999, UK.
4. *Superconductivity Group Annual Conference (IOP) and AGM*
University of Birmingham, April 2000, UK.
5. *Postgraduate Workshop in Magnetism: Transport and Thermodynamics*
Institute of Physics (IOP), London, November 2000, UK.
6. *Superconductivity Group Annual Conference (IOP)*
University of Birmingham, April 2001, UK.
7. *Mesoscopic Phenomena in Superconductors (IOP)*
Bristol University, September 2001, UK.
8. *Superconductivity Group Annual Conference (IOP)*
University of Birmingham, January 2002, UK.
9. *19^{th} General Conference of the Condensed Matter Division of the European Physical Society*
Brighton, April 2002, UK.
10. *Workshop on Critical Fluctuations in Spin and Charge Systems*
University of Cambridge, 13 – 14 November 2008, UK.
11. *Mathematical Challenges from the Physics of Soft and Biological Matter*
AS-ICTP, 2 – 13 May 2011, Trieste, Italy.
12. *Workshop on Advanced Oxide Interfaces*
AS-ICTP, 9 – 13 May 2011, Trieste, Italy.
13. *Workshop on Integrability and its Breaking in Strongly Correlated and Disordered systems*
AS-ICTP, 23 – 27 May 2011, Trieste, Italy.
14. *Summer School on Quantum Many-Body Physics of Ultra-Cold Atoms and Molecules*
AS-ICTP, 2 – 13 July 2012, Trieste, Italy.
15. *Workshop on Effective Gravity in Fluids and Superfluids*

AS-ICTP & International School for Advanced Studies (SISSA), 9 – 13 July 2012, Trieste, Italy.

16. *Workshop on Quantum Simulations with Ultra-Cold atoms*
AS-ICTP, 16 – 20 July 2012, Trieste, Italy.
17. *Spring College on the Physics of Complex Systems*
AS-ICTP, 26 May – 20 June 2014, Trieste, Italy.
18. *Hands-On Research in Complex Systems School*
AS-ICTP, 30 June – 11 July 2014, Trieste, Italy.
19. *International Conference on Advances in Physics (ICAP) 2015*
Department of Physics, University of Rajshahi, 18 – 19 April 2015, Bangladesh.
20. *Workshop on Interacting Fermions: Precision Theory and Experiment*
AS-ICTP, 06 – 10 July 2015, Trieste, Italy.
21. *School and Workshop on Strongly Correlated Electronic Systems – Novel Materials and Novel Theories*
AS-ICTP, 10 – 20 August 2015, Trieste, Italy.
22. *The Bangladesh Physical Society (BPS) National Conference on Physics-2019* 07-09 February 2019, Dhaka, Bangladesh.
23. *International Conference on Physics – 2020* (BPS), 5 – 7 March, 2020, Dhaka, Bangladesh.

Current/past memberships:

Institute of Physics (IOP), UK, American Physical Society (APS), Cambridge Philosophical Society (UK), Cambridge Commonwealth Trust (UK), Life-member of Bangladesh Physical Society (BPS), and Member of Asian Council of Science Editors (ACSE).

Duty as Editor, Advisor, Referee, Organizer, and Columnist:

Acting as a referee for a large number of national and international journals including *Nature communications*, *Physical Review B* and *Physical Review Letters*, *Scientific Reports*. Member of the Advisory Board and Section Editor of the *Journal of Scientific Research* (ISSN 2070-0237 (Print); ISSN 2070-0245 (Online)). Member of the Editorial Board of the *Journal of Bangladesh Academy of Sciences*, published by the Bangladesh Academy of Sciences. Acted as the conference secretary of the ICAP 2015. Editor of the Conference Proceedings entitled *International Conference on Advances in Physics 2015*, published in the *Journal of Physics: Conference Series* by the Institute of Physics, UK. Invited Guest Editor of Special Issue of *Frontiers in Physics*. Frequent contributor in various national dailies on science education and related aspects in Bangladesh. Former advisor, National Young Academy of Bangladesh (NYAB).

Outreach activity:

Acted as the convener of the Divisional Physics Olympiad Committee, Bangladesh, as a member of the organizing committee of the Divisional Science Olympiad Committee of the Bangladesh Academy of Sciences (BAS), and as a member of the organizing committee of the Young Scientists Congress (YSC) of the BAS.

Research supervision:

Number of M.Sc. students: 30
Number of M.Phil. students: 03
Number of Ph.D. students: 04

Number of 4th year research project students: 15

Brief description of research and teaching interests:

The level of interest in cuprate high-temperature superconductors exceeds that in any other field of inorganic science except semiconducting microelectronics and possibly micro-photonics. After more than thirty years since the discovery of these highly correlated electronic systems, there is still no agreement on the basic physics that leads to high superconducting transition temperatures or the anomalous normal-state properties associated with the complex phase behavior. One of the outstanding problems that remains to be resolved is the origin of the so-called *pseudogap phase* which is observed in a number of experimental study over a certain range of hole concentration per CuO_2 planes (the common feature for all cuprate superconductors). Contrary to one of the basic tenets of the Fermi-liquid theory, low-energy excitations are gapped along certain parts of the Brillouin zone when the pseudogap is present. It is widely believed that understanding pseudogap can lead to the understanding of the mechanism of cuprate superconductivity.

I have done extensive transport and magnetic measurements on Zn and Ca substituted Y123 (sintered and c-axis oriented thin film) and Zn substituted La214 compounds over a large range of carrier concentrations and disorder contents in the last twenty-five years. I have investigated the role of pseudogap on the charge transport and magnetic properties of high-T_c cuprates over extended range of hole content, and studied their possible connections to a quantum critical point. I am also interested in critical currents and currently studying its doping and disorder dependences in cuprate superconductors. This part of my research has industrial implication. Furthermore, I am studying magneto-transport properties of oxygen isotope substituted cuprate superconductors. This will help to clarify possible roles played by phonons on various normal and superconducting state properties. Recently I have started working on Nernst effect of pure and Zn-substituted Y(Ca)123. This would be helpful in clarifying the possible roles played by superconducting fluctuations and disorder at different hole concentrations in the CuO_2 planes. Besides, I am working on the first-principles electronic band structure calculations and investigations of thermo-physical properties of iron-oxypnictide superconductors, recently discovered ternary superconducting compounds, high-T_c hydrides, industrially important MAX and MAB phase nanolaminates, intermetallic compounds, energy harvesting semiconducting compounds, and topological insulators, semimetals, and superconductors. I have active research collaborations with the Quantum Matter group, Cavendish laboratory, University of Cambridge, UK, Materials Science group, University of Coventry, UK, Imperial College, UK, Queensland University of Technology, Australia, and Mascara University, Algeria.

I have received several national and international research grants to build the computational physics lab at my department.

So far, I have published over 170 papers on various aspects of superconductivity in cuprates and other recently discovered novel superconducting materials including high-T_c hydrides, on technologically important MAX and MAB phases, topological systems, and other compounds with prospect of large scale industrial applications. These published papers have around 4500 citations, till date. Based on the productivity, citations by peers, and research outcomes, the computational condensed physics laboratory under my guidance has been able to establish itself as the top physics lab in this discipline in Bangladesh.

I have active engagement in curriculum development and teaching and research pedagogy. I have worked as the head of the departmental Self Assessment Committee (SAC) as a part of the Institutional Quality Assurance Committee (IQAC). I have served as the subject expert of the external peer review team to assess the functionalities of the leading universities in Bangladesh.

I believe teaching is one of the most beneficial forms of intellectual interaction that not only stimulates the minds of the students but also broadens the knowledge of the teacher to a great extent. I would like to be a teacher who listens to his students and encourages them in every possible way so that learning becomes a matter of a very active participation from the part of the students. Inspiring young minds to embrace new ideas is the most rewarding part of teaching, and gives the teacher immense satisfaction. **I have been consistently selected as the best teacher and researcher in the department (consisting of around 30 full-time faculty members) by the students over the years. I would love to explore new research and teaching possibilities with the students, experts, and other faculty members of the department, given the chance.**

Names and addresses of four academic referees:

1. Professor J.L. Tallon
   MacDiarmid Institute for Advanced Materials and Nanotechnology
   and Industrial Research Ltd.
   P.O. Box 31310
   Lower Hutt, New Zealand
   Phone: +64-4-9313293 e-mail: jeff.tallon@vuw.ac.nz
2. Dr. J.R. Cooper
   Emeritus Professor
   Quantum Matter group, Cavendish Laboratory
   University of Cambridge
   J. J. Thomson Avenue
   Cambridge CB3 OHE, UK
   Phone: +44-1223-337445 e-mail: jrc19@cam.ac.uk
3. Dr. Sultana Nahar
   Professor, Department of Astronomy
   The Ohio State University
   4055 McPherson Lab
   140 West 18th Avenue
   Columbus, Ohio 43210-1173 e-mail: nahar.1@osu.edu
4. Dr. A.K.M. Azharul Islam
   Emeritus Professor (Retired), Department of Physics
   University of Rajshahi
   Rajshahi 6205, Bangladesh e-mail: azi46@ru.ac.bd

Current address:

Professor Saleh Hasan Naqib
Department of Physics
University of Rajshahi
Raj-6205
Bangladesh

e-mail: salehnaqib@yahoo.com
Phone: +88-(0)721-750288; Fax: +88-(0)721-750064; Cell: +8801715049589

Web-links:

https://scholar.google.com/citations?user=r10IiGoAAAAJ&hl=en
https://www.researchgate.net/profile/S-Naqib