

Chaturanan Mallik

Date of Birth October 17, 1952

EDUCATION

Indian School Certificate Examination, Science Stream, 1969
B.Sc (Physics Honours) Ravenshaw College, Cuttack, 1974, Honours with Distinction
M. Sc (Physics) Utkal University 1976
Joined 21st batch of Training School, BARC in Physics stream 1977

AFFILIATIONS TO INSTITUTIONS

1978

Joined Variable Energy Cyclotron Centre, Kolkata

Variable Energy Cyclotron Centre

Department of Atomic Energy

I/AF, Bidhan Nagar

Kolkata, India

1986-87 Institute of Physical and Chemical Research (RIKEN), Japan

2001-02 National Superconducting Cyclotron Laboratory, East Lansing , Michigan, USA

October 31, 2012 Superannuation from VECC, Department of Atomic Energy as Outstanding Scientist

Joined Department of Pure and Applied Physics of Guru Ghasidas Vishwavidyalay on March 18, 2013.

PROFESSIONAL EXPERIENCE

1979-88

Was involved with the commissioning of K130 cyclotron. This involved beam dynamics and beam development with the cyclotron.

1981

Was involved with the design of the external beam lines for K130 cyclotron. "TRANSPORT computations were carried out.

Three beamlines were installed and commissioned for experiments

1986-87

Worked at Institute of Physical and Chemical Research, Japan on the beam dynamics of Separated Sector Cyclotron.

1989-1997

Involved with the first ECR Ion Source development in the country

Designed extraction and beam analysis system for the ECR Ion Source. The system was commissioned and made functional.

Designed injection system for injecting heavy ion beams from ECR source into the K130 cyclotron. The whole system was installed and first beam was injected and accelerated into the cyclotron

1993-1996

Project Leader for HIGH RESOLUTION BEAM LINE

A project was undertaken to study behaviour of a large 160 degree magnet to improve the beam quality coming from the cyclotron in terms of energy spread. The beam line was designed in dispersive mode and was made functional in 1996 when resolved beam was obtained.

1998-2012

Work on design and development of different subsystems of superconducting cyclotron were started.

2001-2002

Worked as visiting scientist at National Superconducting Cyclotron Laboratory

Electric stress in complex insulator based geometries in the extraction system of a superconducting cyclotron was carried out.

Beam computations using several beam dynamics codes specifically for superconducting cyclotrons were carried out.

1997-2007

Project Leader for the "HEAVY ION ACCELERATION USING ECR ION SOURCE"

Heavy Ion acceleration work in the K130 cyclotron was carried out in terms of development of new ion beams and energy. About 200 MeV oxygen and 300 MeV Argon beams were obtained among several other beams. This really opened opportunities at VECC to carry out important nuclear physics experiments for national users for the first time in th country

2002-2009

Design of injection system, extraction system and diagnostics were carried out. Several beam dynamics simulations were carried out as part of group activity.

Project Manager for SUPERCONDUCTING CYCLOTRON PROJECT

2007-2009

Extensive efforts were put to modernize and upgrade the K130 cyclotron

Project Manager for "MODERNISATION OF VEC TECHNICAL SYSTEMS"

2005-12

The superconducting magnet of the superconducting cyclotron was commissioned.

And first internal beam was obtained. The work was reported in the International Cyclotron Conference held in Lanzhou, China in 2010.

RESEARCH INTERESTS

Cyclotrons, Beam dynamics, science and technology of Accelerators

Low Energy Accelerators for Research and Societal benefits

Beam Optics and beam lines

Magnet Design

Cancer therapy using cyclotron

AWARDS

2006

1. DAE Group Achievement Award

Member of the group involved in developing Large Superconducting Magnet

2009

2. DAE Group Achievement Award
Group Leader for "Construction and Commissioning of Superconducting Cyclotron"
2010
3. DAE Group Achievement Award
"ECR and RFQ based low energy ion beam facilities for material science research at VECC

PRESENTATIONS AND
INVITED TALKS (Last Ten Years)

1. **First beam acceleration in Kolkata Superconducting cyclotron and its present status** (Talk presented)
Chaturanan Mallik and Rakesh Bhandari
International Conference on Cyclotrons and Their Applications, 6-9 October 2010, Lanzhou, China
2. **Superconducting Cyclotron and 224cm Cyclotron: Their present Status and recent developments** (Invited Talk)
C. Mallik and R. K. Bhandari
Indian National Particle Accelerator Conference, February 15-18, New Delhi 2011
3. Series of lectures were given at
VECC-KEK JOINT SCHOOL ON SUPERCONDUCTING TECHNOLOGY
Held at Kolkata from March 16-20, 2009
4. **Status of Cyclotrons at VECC**
C. Mallik
Nucleus Nucleus collisions around Fermi energy-2010(NNCAFE)
December 16-17, 2010, Kolkata
5. **Accelerator Activities at VECC**
G. G. University, Bilaspur, Chhattisgarh March 2010
6. **STATUS OF 224 CM CYCLOTRON AT VECC**
Indian Particle Accelerator Conference, BARC, Mumbai, 2006
7. **ACCELERATOR ACTIVITIES AT VECC**
DAE- BRNS SYMPOSIUM ON NUCLEAR PHYSICS, Vadodara, December 2006
8. **STATUS OF SUPERCONDUCTING CYCLOTRON**
DAE- BRNS SYMPOSIUM ON NUCLEAR PHYSICS, Sambalpur, December 2007
9. SUPERCONDUCTING CYCLOTRON PROJECT AT VECC
Banaras Hindu University, Varanasi, DECEMBER 2004
10. ACCELERATOR ACTIVITIES AT VECC, KOLKATA
Jadavpur University, Kolkata, December 2005

11. SUPERCONDUCTING CYCLOTRON PROJECT AT VECC
DAE- BRNS SYMPOSIUM ON NUCLEAR PHYSICS, Thirunerveli, December 2003
12. ACCELERATOR ACTIVITIES AT VECC
DAE- BRNS SYMPOSIUM ON NUCLEAR PHYSICS, Vadodara, December 2006
13. STATUS OF ROOM TEMPERATURE CYCLOTRON AT VECC, KOLKATA
Indian Particle Accelerator Conference, Kolkata, 2005
14. STATUS OF 224 CM CYCLOTRON AT VECC
Indian Particle Accelerator Conference, BARC, Mumbai, 2006
15. ACCELERATORS AT VECC, KOLKATA
Symposium on Accelerator and Atmospheric Sciences, CUTTACK, December 2006
16. Review Talk on “High Power Beams” presented at
DAE-BRNS Symposium on Ion Beam Technology and their Applications
Held at Mumbai on March 12, 2007

ORGANISING SYMPOSIUM/CONFERENCES/WORKSHOP

1. A DAE-BRNS workshop on
ION BEAMS AT VECC AND THEIR APPLICATIONS IN BASIC AND APPLIED SCIENCES (IBVEC)

Was organized at VECC, Kolkata from September 12-14, 2007

It was attended by about 180 participants from all over the country.

- 2 .A Theme Meeting on
CANCER THERAPY IN INDIA USING ION BEAMS (CTIB)
was organized at VECC, Kolkata on March 26, 2010
to explore the possibility of using accelerators for cancer therapy in India.
It was attended by 80 oncologists, radiation physicists and doctors

LIST OF PUBLICATIONS (Last Ten Years)

1. COMMISSIONING STATUS OF KOLKATA SUPERCONDUCTING CYCLOTRON

Chaturanandan Mallik & Rakesh K. Bhandari

International Particle Accelerator Conference, 2011, Spain

2. ***“First beam acceleration in Kolkata Superconducting cyclotron and its present status “***

Chaturanandan Mallik and Rakesh Bhandari,

International Conference on Cyclotrons and Their Applications, 6-9 October 2010, Lanzhou, China.

3 *Magnetic Field Mapping of Kolkata Superconducting Cyclotron*,

C. Mallik, M K. Dey, R. K. Bhandari, et al.,

Proceedings of the 18th Int. Conf. on Cyclotrons and Their Applications 2007, Oct. 1-5, 2007, Giardini Naxos, Italy, page 435.

4. *“Extraction System and External Beam Handling System of Kolkata Superconducting Cyclotron”*

C. Mallik, M. K. Dey, R. K. Bhandari, et al.,

Proceedings of the 18th Int. Conf. on Cyclotrons and Their Applications 2007, Oct. 1-2007, Giardini Naxos, Italy, page 343.

5. The Electron Cyclotron Resonance Ion Source at Variable Energy Cyclotron Centre, Calcutta.

Bikash Sinha, D K Bose, G S Taki, C Mallik, G Pal & P Y Nabhiraj

Proc. 14th International Conference on Cyclotrons and their applications.

Capetwon(1995)

6. Status of Variable Energy Cyclotron at Kolkata

C Mallik, G Pal, S Bhattacharya, P Y Nabhiraj, et al.

InPAC-2003, Feb 3-6 2003 P-127

7. Heavy Ion acceleration using 224 cm cyclotron at Kolkata APAC04, March 2004, South Korea

C. Mallik,, Nabhiraj P Y et al (in press)

8. *“Superconducting Cyclotron and 224cm Cyclotron: Their present Status and recent developments”*

C. Mallik and R. K. Bhandari

Indian National Particle Accelerator Conference, February 15-18, New Delhi 2011.

9. *“Status of Variable Energy Cyclotron at Kolkata”*

C. Mallik

Indian Particle Accelerator Conference (INPAC-2006), Nov 1-4, 2006, p28-30.

10. *“Accelerator Activities at VECC”*

C. Mallik

Low Energy Accelerators and Their Applications, University of Bilaspur, Chhatisgarh.

11. *“Operational Experience of Superconducting Cyclotron Magnet at VECC, Kolkata”*

Uttam Bhunia, **Chaturan Mallik**, Rakesh Kumar Bhandari, Pranab Bhattacharyya, Tamal Kumar Bhattacharyya, Jayanta Chaudhuri, Malay Kanti Dey, Ranadhir Dey, Anjan Dutta Gupta, Chinmay Nandi, Md. Zamal Abdul Naser, Gautam Pal, Umashankar Panda, Jedidiah Pradhan, Subimal Saha

International Conference on Cyclotrons and Their Applications, 6-9 October 2010, Lanzhou, China

12. "An estimate of electron temperature in 14.4 GHz ECRIS plasma by analysis of bremsstrahlung spectra"

Ranjini K, P Y Nabhiraj, S K Das, C Mallik and R K Bhandari
Indian Journal of Pure & Applied Physics Vol 45, Dec 2007, PP 965-968

13. "Study of Magnetic Field Imperfections of Kolkata Superconducting Cyclotron"

Jedidiah Pradhan, Rakesh Kumar Bhandari, Uttam Bhunia, Jayanta Debnath, Malay Kanti Dey, Chaturan Mallik, Santanu Paul
International Conference on Cyclotrons and Their Applications, 6-9 October 2010, Lanzhou, China

14. "Minimisation of Higher Order Harmonics for Large Aperture Superferric Quadrupole Magnet"

Atanu Dutta, P. R. Sharma, C. Nandy, S. Roy, G. Pal, C. Mallik
Proceedings of Indian Particle Accelerator Conference, 2011, Delhi

15. "Magnetic Field Simulation Using RADIA and TOSCA for Kolkata Superconducting Cyclotron",

J Pradhan, M. K. Dey, C. Mallik, R. K. Bhandari, et. al.,
Proceedings of the 18th Int. Conf. on Cyclotrons and Their Applications 2007, Oct. 1-5, 2007, Giardini Naxos, Italy Page 441.

16. "Beam Extraction System and External Beam Line of Kolkata Superconducting Cyclotron"

Jayanta Debnath, Sumantra Bhattacharya, Chaturan Mallik, Gautam Pal, et al
International Conference on Cyclotrons and Their Applications, 6-9 October 2010, Lanzhou, China

17. "Compact Inductive Coupled Plasma based ion beam sputtering system for thin film deposition"

P Y Nabhiraj, R Menon, G Mohan Rao, S Mohan, C Mallik and R K Bhandari
IVSNS 2009 Nov 11-13, 2009, CEERI Pilani

18. "Operational experience of superconducting cyclotron magnet at VECC, Kolkata"

U Bhunia, J Pradhan, Md. Z A Naser, U S Panda, C Nandi, T K Bhattacharyya, A Dutta Gupta, M Ahmed, A Dutta, G Pal, S Saha, R. Dey, C Mallik and R K Bhandari,
National Symposium of Cryogenics-23, Rourkela, 2010

19. "Characteristics of Beam Extraction system of K500 Superconducting Cyclotron",

S. Paul, J. Debnath, M.K. Dey, J. Pradhan, A. Dutta, C. Mallik, et al,
Asian Particle Accelerator Conference (APAC-07), 29th January-2nd February 2007 at RRCAT, Indore.

20. “Beam Injection System of the Kolkata Super-conducting Cyclotron”

M. K. Dey, C. Mallik, R. K. Bhandari et al.,
Proceedings of the 18th International Conference on Cyclotrons and Their Applications 2007, Oct. 1-5, 2007, Giardini Naxos, Italy, page 346.

21. “Beam Diagnostic Components for Superconducting cyclotron at Kolkata”,

S. Roy, S. Bhattacharya, T. Das, T.K. Bhattacharyya, G. Pal, C. Mallik and R.K. Bhandari, 19th International Conference on Cyclotrons and their Applications, CYCLOTRONS'10, Lanzhou, China, September 6-10, 2010.

22. “Design of the proposed 250 MeV Superconducting Cyclotron Magnet”,

M. K. Dey, C. Mallik, R.K. Bhandari et al.,
Proceedings of the Asian Particle Accelerator Conference, 2007, Indore.

23. “Study of Vacuum Related Problems During the Energization of K500 Superconducting Cyclotron”

Md. Z.A.Naser, U.Bhunia, J. Pradhan, J Debnath, S. Paul, M.Dutta, A. Pole, D.L.Bandopadhaya, A. Sur, C. Mallik and R.K.Bhandari :
Asian Particle Accelerator Conference (APAC) 2007.

24. “Coil Centering of the Kolkata Superconducting Cyclotron Magnet”:

M. K. Dey, C. Mallik, R. K. Bhandari, et. al.,
Proceedings of the 18th Int. Conf. on Cyclotrons and Their Applications 2007, Oct. 1-5, 2007, Giardini Naxos, Italy, page 438.

25. Multi Component Adsorption Studies on LiLSX and CMS for Helium Separation

Nisith Das, Pradeep Kumar, C. Mallik, R. K. Bhandari
Adsorption Science and Technology, Vol 28, No.3, 2010

26. “Magnetic field measurement and correction of VECC K500 superconducting cyclotron”,

M. K. Dey, J. Debnath, U. Bhunia, J. Pradhan, H. Rashid, S. Paul, , A. Dutta, Z. A. Naser, V. Singh, G. Pal, C. Nandi, S. Dasgupta, S. Bhattacharya, S. Pal, A. Roy, T. Bhattacharya, R. B. Bhole, D. Bhale, M. Chatterjee, R. Prasad, P.Y. Nabhiraj , C. Mallik et al.

Indian Particle Accelerator Conference (InPAC-2006), Nov 1-4, 2006. p 205.

27. “3D Field simulation results for K-500 SCC magnet using Opera-3D (TOSCA) code”,

A Dutta, M K Dey, C. Mallik et al,
Indian Particle Accelerator Conference (InPAC 2006), Mumbai.

28. “Field Measurement Studies of Active Magnetic Channel M9 OF K-500

Superconducting Cyclotron in VECC Kolkata,
J Pradhan, M K Dey, **C. Mallik** et al.,
Indian Particle Accelerator Conference (InPAC), 2006, Mumbai.

29. ***“Characteristics of the Magnetic Channel in the Yoke Hole of K-500 Superconducting Cyclotron”***,

J. Pradhan, M. K. Dey, **C. Mallik**, R. K. Bhandari, et al.
Proceedings of the Asian Particle Accelerator Conference, 2007, Indore.

30. ***“Design of the Proposed 250 MeV Superconducting Cyclotron Magnet for Proton Therapy”***,

M.K. Dey, **C. Mallik**, R. K. Bhandari et al.
Proceedings of Indian Particle Accelerator Conference, 2006, Mumbai, page 301.

31. ***“Design of the Spiral Inflector and Axial Injection System for VECC K500 Superconducting Cyclotron”***,

M.K. Dey, **C. Mallik** et al.,
Proceedings of Indian Particle Accelerator Conference 2006, Mumbai, page 143.

32. ***“Quadrupole Triplet for External Beam Line of K-500 Cyclotron”***

U. Bhunia, P. Bhattacharya, S. Sur, J.Pradhan, S.Paul, M.K.Dey, J Debnath, ZA Naseer, A.Dutta, V. Singh, MHRashid, **C. Mallik**
Indian Particle Accelerator Conference (InPAC) 2006.

33. ***“Design of high current RF ion Source for micromachining applications”***,

P.Y. Nabhiraj, Ranjini Menon, **C. Mallik**, R.K. Bhandari
APAC07, Jan 29 – Feb 02, 2007, RRCAT, Indore

34. ***“Design of compact low energy ion beam focusing column for plasma based FIB system”***

P.Y. Nabhiraj, K Ranjini, **C. Mallik**, G. Mohan Rao, S. Mohan and R. K. Bhandari.
Indian Particle Accelerator Conference (InPAC)-2006, Nov 1-4, 2006. P – 211

35. ***“ Development of langmuir probe Diagnostic system for 13.56 Mhz plasma sources”***

K. Ranjini, P.Y. Nabhiraj, **C. Mallik** and R.K. Bhandari
Indian Particle Accelerator Conference (InPAC)-2006, Nov 1-4, 2006. P – 237

36. ***“Optical design layout of K500 SCC injection beam line”***

J. Debnath, S. Paul, M. H. Rashid, Z. A. Naser, G. Pal, P Y Nabhiraj, **C. Mallik** et al.
Indian Particle Accelerator Conference (InPAC)-2006, Nov 1-4, 2006. P – 205

37. ***“Drive system instrumentation for SCC axial-hole magnetic field measurement”***,

T.K. Bhattacharyya, T. Das, C. Nandi, G. Pal, **C. Mallik** and R.K. Bhandari,
Asian Particle Accelerator Conference, January, 2007, CAT Indore.

38. ***“Charge analyzing and bending magnets in injection line of the K500 cyclotron”***,

M H Rashid, J Debnath and **C Mallik**,

Indian Particle Accelerator Conference (INPAC) -2006, p 12.

39. ***“Median Plane Magnetic Field Mapping for Superconducting Cyclotron in VECC”***,

A Roy, M.K. Dey, **C. Mallik**, et al.

Proceedings of the Asian Particle Accelerator Conference, 2007, Indore.

40. ***“Calculation of current settings for Superconducting cyclotron trim coils operating simultaneously in field trimming mode and harmonic mode”***,

J Debnath, **C. Mallik** et.al.,

Indian Particle Accelerator Conference, February 10-13, 2009 RRCAT,Indore.

41. ***“Iron Ion beam development from 14.4 GHz ecr ion source”***,

P Y Nabhiraj, Ranjini Menon, Mou Chatterjee, Suman Guha, Anurag Misra, G Pal, **C. Mallik** and R K Bhandari.

InPAC-2009, Raja Ramanna Centre for Advanced Technology, Indore, February 10-13, 2009.

42. ***“Design Optimization of the Magnet of 250 MeV Superconducting Cyclotron for Proton Therapy”***

Malay Kanti Dey, A. Dutta Gupta, A. Dutta, M. Ahammed, **C Mallik**, J Chaudhuri and R K Bhandari,

43. ***“3D Electromagnetic Field Simulation for Cyclotron Design”***,

Atanu Dutta, M K Dey, **C. Mallik**, et. al.,

Indian Particle Accelerator Conference (InPAC), Feb10-13, 2009.

44. ***“Beam tuning parameters for the Kolkata Superconducting Cyclotron”***

J. Debnath, M. K. Dey, **C. Mallik** et. al.,

Indian Particle Accelerator Conference, February 10-13, 2009 RRCAT,Indore

45. ***“Mechanical and Magnetic Measurement of Quadrupole Triplets for External Beam Line of K500 cyclotron”***

U. Bhunia, M K Dey, **C. Mallik**, R. K. Bhandari, et. al., ,

Indian Particle Accelerator Conference (InPAC), Feb10-13, 2009.

46. ***“Beam Dynamical Issues of Kolkata Superconducting Cyclotron”***

J. Debnath, **C. Mallik**, et al,

CREMC-2008, June 25, 2008, VECC.

47. ***“Cyclotrons for Therapeutic and Diagnostic Applications”***

M. K. Dey, **C. Mallik** and R. K. Bhandari, ,

Proceedings of Workshop on Cyclotrons: Rising Expectations and Mounting Challenges, VECC, Kolkata, June 2008.

48. “Magnet dependent leak in superconducting cyclotron vacuum system”

M Dutta, C. Mallik et.al.,

InPAC 2009 (RRCAT,Indore)

49. “Fabrication of Beam Diagnostic Components for Superconducting Cyclotron at Kolkata”,

S. Roy, S. Bhattacharya, T. Das, T.K. Bhattacharyya, S. Pal, G. Pal, **C. Mallik** and R.K. Bhandari,

DAE-BRNS Workshop on Cyclotrons – Rising Expectations Mounting Challenges, June 25-26, 2008, VEC Centre.

50. “Superconducting cyclotron deflector conditioning status – an experience with high voltage”,

S. Ghosh, **C. Mallik** et.al.,

InPAC 2009 (RRCAT,Indore).

51. “Development of M9 slit for K500 cyclotron”,

T K Bhattacharya, G. Pal, **C. Mallik** et. al.,

InPAC 2009 (RRCAT,India)

52. “Fabrication and Characterization of Tungsten field emission probes”,

Ranjini Menon, P Y Nabhiraj, C Mallik and R K Bhandari

IVSNS 2009 Nov 11-13, 2009, CEERI Pilani.