Curriculum vitae

Name: Dr. Ashok Kumar

Father's Name: Late Sh. Ranjeet Singh

Designation: Professor

Research Interest: Experimental Nuclear Physics &
Neutrino Physics

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Current Research Interest:

(i) Neutrino Physics

I am the part of the collaboration of the NOνA experiment at Fermi National Accelerator Laboratory (FNAL) USA. Fermilab's accelerator complex produces intense neutrino beam and sends it through the earth to northern Minnesota. Neutrinos rarely interact with matter. When a neutrino smashes into an atom in the NOνA detector in Minnesota, it creates distinctive particle tracks. The interactions of these particles are explored to understand the transition of muon neutrinos into electron neutrinos. The experiment also helps to answer important scientific questions about neutrino masses, neutrino oscillations, and the role neutrinos played in the early universe. Few students from our group are already stationed at Fermi Laboratory to pursue their Ph. D. work.

I also have the interest in the upcoming facility of INO (India-based neutrino observatory) which is underway to build an underground neutrino detector in India. The physics motivation for INO is (i) To reconfirm the oscillation through appearance and disappearance of neutrinos (ii) To measure the neutrino oscillation parameters. (iii) To determine neutrino mass hierarchy. We developed a software in C++ to find the Muon track in the ICAL detector of INO using HOUGH transform. We have developed a part of the software to extract the straight lines and parabolas immersed in the high background. Recently, a M. Phil. Student has submitted a thesis under my supervision on this topic.

(ii Study of High Spin Structure and Lifetimes of Nuclear states by RDM and DSAM:

Our group is engaged in lifetime measurements of excited states in the two mass regions, Xe-Ba-Ce and A=170-190. For this purpose, we are using the Indian National Gamma Array (INGA) device with GDA Clover detectors (21 at present) with ACS at Nuclear Science Centre New Delhi and Tata Institute of Fundamental Research (TIFR). Lifetimes are extracted using the computer codes LIFETIME and LINESHAPE by J. C. Wells for RDM and DSAM measurements.

(iii) Study of PreScission and PostScission Charged Particle Emission in Heavy Ion Reactions

The fission of highly excited compound nucleus formed in heavy-ion induced fusion reaction has emerged as a topic of considerable interest. It is a dynamical process for which the nucleus needs time to deform up to scission. Neutrons and charged-particle (mainly proton and α-particle) emission take pla**ce** from various stages. Prescission and PostScission neutron and charged-particle emission spectra and multiplicities provide important information on the statistical and dynamical aspects of the fusion-fission process. It is observed that α-particles are also emitted very near the neck region in the fission process just before scission. This part of prescission α particles emitted near the neck region is termed as near-scission emission (NSE). Fission fragments are measured with multi wire proportional counters and charged particles are measured with Silicon surface barrier detectors and Cs(I) detectors. For the detection of neutrons, we are using the organic liquid scintilltor (NE213) and time-of- technique to measure the energies of evaporated neutrons with Pulse Shape Discriminators (PSD).

Research Publications in Referred International Journals

128. Fabrication and characterization of thin ^{94}Zr target with gold backing for nuclear lifetime measurements using DSAM
Diwanshu , Abhilash S.R. , Bharti Rohila , Kailash , Ashok Kumar
NIM A 1059 , 169012 (2024)

+18 Nova Publications

109. Measurement of mass-angle and mass-total kinetic energy distributions from the fission of ^{190}Pt compound nucleus
Vikas, Kavita, K.S.Golda, T.K.Ghosh, A.Jhingan, P.Sugathan, A.Chatterjee, B.R.Behera, A.Kumar, R.Kumar, N.Saneesh, Mohit, A.Yadav, C.Yadav, S.Appannababu, S.K.Duggi, R.Dubey, K.Rani, N.Kumar, A.Banerjee, A.Rani, Kajal, Sh.Noor, J.Acharya, H.Singh
J.Phys.(London) G51, 035103 (2024)

108. Evaporation residue cross-section measurements for ^{30}Si+^{142}Ce system
Amninderjeet Kaur, A. Kumar et al.
Nucl. Phys. A 1042, 122791 (2024)

107. Fabrication and characterization of self-supporting and backed ^{107}Ag targets for lifetime measurements using RDM and DSAM
B.Rohila, S.R.Abhilash, Diwanshu, Ch.Sharma, D.Mehta, A.Kumar
Nucl. Instrum.Methods Phys.Res. A1058, 168893 (2024)

106. Three-quasineutron γ-band in ^{127}Xe
S.Chakraborty, H.P.Sharma, S.Jehangir, S.S.Tiwary, C.Majumder, A.K.Gupta, G.H.Bhat, J.A.Sheikh, N.Rather, P.Banerjee, S.Ganguly, S.Rai, Pragati, S.Muralithar, R.P.Singh, S.S.Bhattacharjee, S.Kumar, Mayank, A.Kumar, R.Palit
J.Phys.(London) G50, 075106 (2023)

105. Incipient reflection asymmetry in ^{127}Xe
S.Chakraborty, H.P.Sharma, S.S.Tiwary, C.Majumder, A.K.Gupta, P.Banerjee, S.Ganguly, S.Rai, Pragati, Mayank, S.Kumar, A.Kumar, R.Palit, S.S.Bhattacharjee, R.P.Singh, S.Muralithar
Nucl.Phys. A1037, 122706 (2023)

104. Revisiting band structures in ^{118}Xe nucleus via in-beam γ-ray spectroscopy
A.Pandey, R.Bhushan, A.Rohilla, C.Majumder, H.P.Sharma, S.Chakraborty, R.P.Singh, S.Muralithar, Yashraj, K.Katre, B.Rohila, Subodh, A.Kumar, I.M.Govil, S.Jehangir, N.Rather, G.H.Bhati, A.A.Wani, J.A.Sheikh, S.K.Chamoli
Chin.Phys.C 47, 084002 (2023)

103. Study of dissipation role in fusion-fission reaction dynamics in mass region A > 190 via fission time
C.Sharma, K.Kapoor, A.Kumar
Eur.Phys.J. A 59, 10 (2023)

102. Fission dynamics and entrance-channel study in the ^{210}Po compound nucleus via light-particle multiplicities

C.Sharma, B.R.Behera, Shruti, Amit, B.Rohila, A.Kaur, Subodh, N.Dhanda, A.Kumar, P.Sugathan, A.Jhingan, K.S.Golda, N.Saneesh, M.Kumar, H.Arora, D.Arora, H.P.Sharma

Phys.Rev. C 107, 064615 (2023)

101. Octupole correlations in ^{127}I

S.Chakraborty, H.P.Sharma, S.S.Tiwary, C.Majumder, A.K.Gupta, A.Kumar, P.Banerjee, S.Ganguly, S.Kumar, A.Kumar, R.P.Singh, S.Muralithar

Int.J.Mod.Phys. E30, 2150030 (2021)

97. Multiphonon longitudinal wobbling in ^{127}Xe

S . Chakarborty, H.P. Sharma, S. Tiwary, C. Majumder, A. K. Gupta,P. Banerjee, S. Ganguly,S. Rai, Pragati, Mayank S. KumarA. Kumar,R. Palit,S.S. Bhattacharjee, R. P. Singh,S. Muralithar

Physics Letters B 811, 135854 (2020)

96. Structure of positive parity states in ^{139}Pm

S Tiwary, H P Sharma, S Chakraborty,C Majumder, A K Gupta, Swati Modi, P Arumugam, P Banerjee, S Ganguly, K Rojeeta Devi, Neelam, S Kumar, S K Chamoli, A Sharma, V V Jyothi, Mayank, A Kumar, S S Bhattacharjee, Indu Bala, S Muralithar and R P Singh

Phys. Scr. 95 095304 (2020)

95. **Indication of γ-vibration in $^{123, 125, 127}$I**

S.Chakraborty, H.P.Sharma, S.S.Tiwary, C.Majumder, P.Banerjee, S.Ganguly, S.Kumar, A.Kumar, A.Kumar, R.P.Singh, S.Muralithar

J.Phys.(London) G47, 095104 (2020)

94. Signature splitting in the positive parity bands of ^{127}Xe

S.Chakraborty, H.P.Sharma, S.S.Tiwary, C.Majumder, P.Banerjee, S.Ganguly, S.Rai, P.Popli, S.Modi, P.Arumugam, M.Singh, S.Kumar, A.Kumar, S.S.Bhattacharjee, R.P.Singh, S.Muralithar, R.Palit

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93. γ-vibration in ^{126}Xe: A revisit

S.Chakraborty, H.P.Sharma, S.S.Tiwary, C.Majumder, P.Banerjee, S.Ganguly, S.Rai, Pragati, Mayank, S.Kumar, A.Kumar, R.Palit, S.S.Bhattacharjee, R.P.Singh, S.Muralithar

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92. Intermediate structure and dipole bands in the transitional ^{134}Ba nucleus

Neelam, Suresh Kumar, K. Rojeeta Devi, Naveen Kumar, S. Saha, S. Biswas, P. Singh, F. S. Babra, Md. S. R. Laskar, R. Palit, S. Samanta, S. Das, Ashok Kumar, and Praveen C. Srivastava
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91. Investigation on major, minor and trace elements in some medicinal plants using Particle Induced X-ray Emission
Shashank Singh,Mumtaz Oswal, B. R. Behera, Ashok Kumar, S. Santra, R. Acharya K. P. Singh
Journal of Radio analytical and Nuclear Chemistry (2020) 323:1443–1449

90. PIXE analysis of green and roasted coffee beans and filter coffee powder for the inter-comparison study of major, minor and trace elements
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89. Study of low lying states in ^{69}Ga
Shashank Singh, Mumtaz Oswal, Ashok Kumar, Gulzar Singh, K.P. Singh
Romanian Journal of Physics, (2020)

88. Chemical characterization of Indian coal and coal residues by PIGE and PIXE spectroscopies using proton beams from tandem particle accelerators
Shashank Singh, Mumtaz Oswal, Sk Wasim Raja S. Santrad, R. Acharya, B.R. Behera, Ashok Kumar K.P. Singh
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87. PIXE analysis of green and roasted coffee beans and filter coffee powder for the inter-comparison study of major, minor and trace elements
Shashank Singh, Mumtaz Oswal, B. R. Behera, Ashok Kumar, S. Santra, R. Acharya, *and* K. P. Singh
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86.Possible antimagnetic rotational band in ^{127}Xe
Chakraborty, Saikat; Sharma, Hariprakash; Tiwary, S; Majumder, Chandrani; Banerjee, Polash; Ganguly, Sourav; Rai, S; Popli, Pragati; Muralithar, S.; Singh, R.; Bhattacharjee, S; Kumar, Suresh; Singh, Mayank; Kumar, Ashok; Palit, Rudrajyoti
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85. Study of fusion-fission dynamics of ^{188,190}Pt through fission fragment mass distribution measurements

Phys. Rev C 100, 024626 (2019)

84. **Lifetime measurements in the yrast band of ^{167}Lu**

Aman Rohilla, R. P. Singh, S. Muralithar, A. Kumar, I. M. Govil, and S. K. Chamoli

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83.Study of role of viscosity in fusion-fission dynamics via simultaneously measured neutron and alpha-particle multiplicities

K. Kapoor, N. Bansal, Chetan Sharma, S. Verma, K. Rani, R. Mahajan, B. R. Behera, K. P. Singh, A. Kumar, H. Singh, R. Dubey, N. Saneesh, M. Kumar, A. Yadav, A. Jhingan, P. Sugathan, B. K. Nayak, A. Saxena, H. P. Sharma, and S. K. Chamoli

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82. Search for the $23/2^+$ isomeric state in ^{125}Te

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81. Negative parity three-quasiparticle band in ^{127}I

S. Chakraborty, H.P. Sharma, S.S. Tiwary, C. Majumder, P. Banerjee, S. Ganguly, S. Kumar, A. Kumar, **A. Kumar**, R.P. Singh, and S. Muralithar

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80. Fission Dynamics of $^{192, 202, 206, 210}$Po Compound Nuclei by Neutron Multiplicity Measurements

R.Mahajan, B.R.Behera, M.Thakur, G.Kaur, P.Sharma, K.Kapoor, P.Sugathan, A.Jhingan, A.Chatterjee, N.Saneesh, R.Dubey, A.Yadav, N.Kumar, H.Singh, A.Kumar, A.Saxena, S.Pal

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79. Revised level structure in ^{127}Xe

S. Chakraborty, H. P. Sharma, S. S. Tiwary, C. Majumder, P. Banerjee, S. Ganguly, S. Rai, Pragati, Mayank, S. Kumar, S. S. Bhattacharjee, R. P. Singh, S. Muralithar, **A. Kumar** and R. Palit

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78. Systematic study of ^{192,202,206,210}Po compound nuclei using neutron multiplicity as a probe

R.Mahajan, B.R.Behera, M.Thakur, G.Kaur, P.Sharma, K.Kapoor, A.Kumar, P.Sugathan, A.Jhingan, A.Chatterjee, N.Saneesh, A.Yadav, R.Dubey, N.Kumar, H.Singh, A.Saxena, S.Pal

Phys. Rev. C 98, 034601 (2018)

77. Rotational band on a three-quasineutron isomer in ^{127}Xe

S. Chakraborty, H. P. Sharma, S. S. Tiwary, C. Majumder, P. Banerjee, S. Ganguly, S. Rai, Pragati, Swati Modi, P. Arumugam, Mayank, S. Kumar, R. Palit, **A. Kumar**, S. S. Bhattacharjee, R. P. Singh, and S. Muralithar

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76. Dependence of precipitation of trace elements on pH in standard water
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75. Standardisation of the ion beam facility at Chandigarh cyclotron for simulataneous PIXE and PESA analysis
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75. *K*0*S* Production from beryllium target using 120 GeV/c protons beam interactions at the MIPP experiment
A. Singh, **A. Kumar**, A. Raja, V. Bhatnagar, V. Singh
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74. Study of fission time scale from pre-scission neutron and alpha multiplicities in $^{16}O+^{194}Pt$ Reaction
K. Kapoor, S.Verma, P. Sharma, R. Mahajan, N. Kaur, G. Kaur, H. Singh, R. Dubey, N. Saneesh, G. Mohanto, B. K. Nayak, A. Saxena, A. Jhingan, P. Sugathan, H.P. Sharma, S.K.Chamoli, I. Mukul, B.R. Behera, K.P. Singh and **A. Kumar**

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S. Chakraborty,H. P. Sharma, S. S. Tiwary, C. Majumder, P. K. Prajapati,S. Rai,P. Popl, M. Singh, S. S. Bhattacharjee, R. P. Singh, S. Muralithar,P. Banerjee,S. Ganguly,S. Kumar, **A. Kumar** , R. Palit
Brazilian Journal of Physics, Volume 47, Issue 4, pp.406 (2017)

71. Investigating Prolate-Oblate Shape inversion in Pt Nuclei Near A – 188
S.K.Chamoli, A.Rohilla, C.K.Gupta, R.P.Singh, S.Muralithar, S.Chakraborty, H.P.Sharma, **A.Kumar**, I.M.Govil, D.C.Biswas
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70. Influence of Positive Q-value Neutron Transfer Coupling on Fusion Enhancement in $^{28}Si+^{154}Sm$ Reaction
G.Kaur, B.R.Behera, A.Jhingan, R.Dubey, M.Thakur, P.Sharma, R.Mahajan, T.Banerjee, Khushboo, N.Saneesh**, A.Kumar**, S.Mandal, B.K.Nayak, A.Saxena, P.Sugathan, N.Rowley
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69. Nuclear structure of ^{76}Ge from inelastic neutron scattering measurements and shell model calculations
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68. Collective quadrupole behavior in ^{106}Pd
F.M.Prados-Estevez, E.E.Peters, A.Chakraborty, M.G.Mynk, D.Bandyopadhyay, N.Boukharouba, S.N.Choudry, B.P.Crider, P.E.Garrett, S.F.Hicks, **A.Kumar**, S.R.Lesher, C.J.McKay, M.T.McEllistrem, S.Mukhopadhyay, J.N.Orce, M.Scheck, J.R.Vanhoy, J.L.Wood, S.W.Yates
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67. Lifetime measurements in shape transition nucleus ^{188}Pt
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66. **E0 transitions in ^{106}Pd: Implications for shape coexistence**
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63. Barrier distribution from ^{28}Si+^{154}Sm quasielastic scattering: Coupling effects in the fusion process
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62. Particle-hole configurations in reaction mechanisms for single-particle level densities for target nuclei in (n, p) reactions at 14.8 MeV energy
H.S. Hans, **A.Kumar**, S. Verma, G Singh, B.R. Behera, K.P. Singh, S. Ghosh
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Rohit Sandal, B. R. Behera, Varinderjit Singh, Maninder Kaur, **A. Kumar**, Gurpreet Kaur, P. Sharma, N. Madhavan, S. Nath, J. Gehlot, A. Jhingan, K. S. Golda, Hardev Singh, S. Mandal, S. Verma, E. Prasad, K. M. Varier, A. M. Vinodkumar, A. Saxena, Jhilam Sadhukhan, and Santanu Pal
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60. Study of lifetimes of low-lying levels in ^{53}Mn
K.P Singh, M. Oswal, B.R. Behera, **A. Kumar**, G. Singh
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59. High spin structure in $^{130, 131}$Ba
N. Kaur, **A. Kumar**, G. Mukherjee,A. Singh, S. Kumar,R. Kaur, V. Singh, B.R. Behera, K.P. Singh,G. Singh, H.P. Sharma, S. Kumar, M. Raju,P.V.M. Rao, S. Muralithar,R.P. Singh,R.Kumar,N. Madhvan,R.K. Bhowmik
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M. Kaur, B.R. Behera, G. Singh, V. Singh, R. Sandal**,** **A. Kumar**,H. Singh,G. Singh, K.P. Singh, N. Madhvan, S.Nath, A.Jhingan,J.Gehlot, K.S. Golda,P. Sugathan,D. siwal,S. kalkal, E.Prasad, S. Appannababu
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53. Neutron multiplicity measurements for ^{19}F+$^{194, 196, 198}$Pt systems to investigate the effect of shell closure on nuclear dissipation
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