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Academic Qualification:

1998-2001 Ph.D.

Particle phenomenology Physics, Application in Mesons and Hadrons Decays.

Bristol University (Rank 5), Bristol, England, UK.

Title of PhD thesis:

Matter-Antimatter Asymmetry of b-Quark and B-Meson Decays.

This thesis works with the Standard Model, the quark model and the Factorization method. We investigate the decay rates of matter-antimatter of ***b*** quark and ***B*** meson decays. We presented the Standard Model for families of quarks at tree-level b decays $b \to q_i q_k q_{\bar{j}}$, $q_i \in \{u, c\}$, $q_k \in \{d, s\}$, $q_{\bar{j}} \in \{\bar{u}, \bar{c}\}$ without QCD correction.
The gluonic penguin of hadronic b decays $b \to q_k g \to q_k q_i q_{\bar{j}}$ is studied through the Wilson coefficients of the effective Hamiltonian.
Also we obtain the decay rates of tree plus penguin to compare with the effective Hamiltonian by current-current plus penguin operators.
We describe effective Hamiltonian theory and apply this theory to the calculation of current-current ($Q_{1,2}$), QCD penguin ($Q_{3,\ldots,6}$), magnetic dipole (Q_8) and electroweak penguin ($Q'_{7,\ldots,10}$) decay rates.
We defined the simple coefficients $d_1,\ldots, d_{6,8}$ according to gluon penguin structure and used in the effective Hamiltonian theory.

B mesons are bound states of a quark and a light quark. While the binding is provided by the strong interaction ***B*** mesons can decay by the weak interaction. The fact that only ***B*** mesons can be studied and not free b quarks complicate the extraction of Standard Model parameters from experimental results. Using the spectator quarks for the structuralization of the spectator model for the calculation of ***B*** meson decays. We show, in those decays in which two processes contribute to the same decay mode, that the two processes add coherently.

Colour transparency is the basis for the factorization hypothesis, in which amplitudes factorize into products of two colour singlet current matrix elements. This ansatz has been widely used in heavy-quark physics, as it is almost the only way to treat exclusive hadronic decays. So we describe the factorization method for calculation of leptonic, semileptonic and nonleptonic ***B*** meson decays as well.

We compared the ***B*** , ***D*** and ***K*** mesons and have an isospin analysis of the spectator model for various decays. Also we calculated the decay rates of charm quark, W-exchange and W-annihilation for ***B*** and ***D*** meson. We show that, the W-annihilation term is small for ***B*** and ***D*** mesons, but W-exchange term is small for ***B*** but larger for ***D*** mesons.

Main Supervisor: Prof. W. N. Cottingham.
Bristol University,
Bristol, England, UK.

1997-1998 M-Fill.

I passed the M-Fill examination by Prof. Bareekhtar.
Kief University(KPE), Kief, Ukraine.

Project: Advance Quantum Mechanic, Advance Electrodynamics and Advance Classical Mechanics

1990-1993 M.Sc.

Particle Physics.
TarbiatModaressUniversity, Tehran, Iran.

Average Mark: 17.85 out of 20.

Project: Calculation of Propagators of Electron and Photon in QED Theory.

Main Supervisor: DrFarshadEbrahimi.
ShahidBeheshti University, Tehran, Iran.

1986 -1990 B.Sc.

General Physics. Application in Nuclear, Particle and Relativistic Physics.

Average Mark: 16.85 out of 20.Isfahan University, Isfahan, Iran.

Educational work:

1993 - 1997

- Teacher of

  Fundamental of Physics I, II and III(D.Halliday& R. Resnick or H.C. Ohanian),

  Elementry Modern Physics I and II (R.T. Weidner & R.L. Sell or T.R. Sandin),

  Mathematic Methods for Physics (Gorge Arfken),

Fundamental of ElectromagneticTheory I and II (J.R. Reitz,F.J. Milford & R.W. Chisty)

Introduction to Special Relativistic (H.M Schwarts or J.L. Anderson) for student of Physics and engineering(B.Sc).

2001 - 2012

- Teacher of

  Quantum Physics I and II (S. Gasiorowic or W. Greiner),

  Modern Quantum Mechanic I and II (J.J. Sakurai or G. Baym or E. Merzbacher or W. greiner),

  Relativistic Quantum Mechanic (J.D. Bjorken& S.D. Drell or W. Greiner),

Quantum Field TheoryI and II (F. Mandl& G. Shaw or R.H. Ryder),

Introduction to high Energy Physics (D.H. Perkin),

Quarks and Leptons (Halzen& Martin or Huang),

Introduction to Elementry Particle (D. Griffiths or L. Ryder, Gordon & Beach)

for student of Physics (P.hD&M.Sc).

PUBLICATIONS:

ARTICLES

1- W. N. Cottingham, H. Mehraban and I. B. Wittingham, *" Hadrinic B Decays: Supersimmetric enhancement and a simple spectator model* **", phy.Rev.D.v 60. 114029 (1999).**

2- W. N. Cottingham, H. Mehraban and I. B. Wittingham, *" Factorization and hadronic B decays in the heavy quark limit* **", J. Phys. G28 (IOP): 2843 (2002).**

3- M. Gominejad, H. Mehraban, " *Spectator Model in D Meson Decays* **", talk and poster presented at IPM-LHP06, Tehran, Iran; PSN: IPM-LHP06-19 May, hep-ph/0610175 (2006).**

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9-H.Mehraban, " *Effective Hamiltonian of Electroweak magnetic Penguin for Hadronic b Quark Decay* **" Journal of Sciences, Islamic Republic of Iran 20(2): 167 – 185(2009).**

10- H.Mehraban , " *Spectator Model in D Meson Decays* **", International Journal of Science and Technology, ScientiaIranica, Sharif University of Technology,Vol 16, No. 2, pp. 140-148 (2009).**

11- H.Mehraban,*" Effective Hamiltonian and Effective Penguin Model on b Quark Decays"*, **International Journal of Science and Technology, ScientiaIranica, Sharif University of Technology, Vol 16, No. 5, pp. 371-386 (2009).**

12-H. Meharban, M. Vaezzadeh, M. Saeidi, *Calculation of Nano- Charged Particles Pulsation Frequancy in Tokamak* **", Journal of Fusion Energy (Springer), DOI 10.1007/s10894-009-9194-1, published online : 27 (2009).**

13- H. Mehraban, " *Penguin Decays in b Quark* **", Iranian Journal of Physics Research, Vol. 9, No. 4 (2009) 165-176.**

14- H. Mehraban, "*The Role of Electroweak Penguin and Magnetic dipole QCD Penguin on Hadronic b Quark Decays***", Iranian Journal of Physics Research, Vol. 9, No. 4 (2010).**

15- H. Mehraban, " *Tree-Level and Secound Order Gluon Penguin Structure in B MesonDecays***", Journal of Sciences (Islamic Azad University) JSIAU, Vol. 19, No. 71 (2010) 35.**

16- H. Mehraban, " *CP Violation in B Meson Decays***", Journal of Sciences (Islamic Azad University) JSIAU, Vol. 20 (2010).**

17- H. Mehraban, " *Factorization Method in Semileptonic B Meson Decays***", Journal of Sciences (Teacher Training University), Vol. 9, No. 2, 157-179 (2010).**

18- H. Mehraban, M. Sayahi, " $\mathbf{B \to J/\psi(\pi,K)}$ *Decays within QCD Factorization Approach"* **,Journal of Sciences, Islamic Republic of Iran 21(4): 353 - 367 (2010).**

19- H. Mehraban, M. Sayahi, "*QCD Factorization in Hadronic* $\mathbf{B \to J/\psi(\rho,\pi,K)}$ *Decays "* **Iranian Journal of Science and Technology A (IJST**), **Vol. 34, No. A4 (2010).**

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21-H. Mehraban, "*Transition Rate of b Quark and Antiquark Decays",* **Journal *of Science, Al-Zahra University,* Vol. 24, Spring & Summer (1390).**

22- H. Mehraban," *b Quark Gluonic Penguin Decays***", Journal of Theoretical and AppliedPhysics (JTAP),Vol. 4, No. 3, 15-22 (2010).**

23- M. Eshghi, H. Mehraban," *Dirac-Poschl-Teller problem with Position-Dependent Mass",* **European Journal of Scientific Research, V 54, Issue 1, (2011).**

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25- M. Eshghi, H. Mehraban, *"Eigen Spectra for Manning-Rosen Potential Including a Coulomb-like Tensor Interaction* **", International Journal of the Physical Sciences (IJPS), Vol. 6(29), pp. 6643-6652, 16 November (2011).**

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31- H. Mehraban, "*The Second Order Approximation of QCD Penguin Structure in bQuarkDecays***", Journal of Sciences (Teacher Training University), Vol. 11, No. 3 (2012)157-179.**

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66- B. Yazarloo, H. Mehraban, H. Hassanabadi "*Relativistic Scattering States of the Hellmann Potential***",ActaPhysicaPolonica A, Vol. 127, No. 3, 684 (2015).**

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68- M. Eshghi, H. Mehraban, *"Non-relativistic continuous states in arbitrary dimension for a ring-shaped pseudo-coulomb and energy dependent potentials***", Mathematical Methods in the Applied Sciences (Wiley), DOI: 10.1002/mma. 3592 (2015).**

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