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| [ekhawaja@gmail.com](mailto:ekhawaja@gmail.com)  (0324) 881 6606 | EHSAN ELLAHI KHAWAJA |  |

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| Qualification Overview **Teaching**   * Consistently evaluated as a top-rated teacher by students at multiple institutions globally * Developed and taught Physics, Mathematics and Electrical Engineering courses at A-level, undergraduate and graduate level. * Teaching Philosophy is to convey to students the importance of these subjects in regards to problems faced in daily life.   **Research**   * Directed and executed research and laboratory work on thin films and their applications * Published over 70 well-cited journal articles on thin solid films, lasers and their applications * Developed thin solid film laboratories at multiple institutions * Refereed multiple papers for top physics publications in the US and Europe |  |

## Education

1975 **Adelaide University - Adelaide, Australia**

Ph.D. – Solid state Physics

1968 **Punjab University - Lahore, Pakistan**

M.Sc. - Physics [First Division]

1965 **Forman Christian College - Lahore, Pakistan**

B.Sc. – Physics and mathematics [First Division]

[Recipient of **“Ewing Alumni Gold Medal”**]

## Experience

2005 – 2011 **University of Management and Technology – Lahore, Pakistan**

Professor in Physics

1981 – 2005 **King Fahd University of Petroleum and Minerals – Dhahran, Saudi Arabia**

Professor – Physics Department / Research Institute

1995 – 1996 **LACAS, Lahore, Pakistan** (On leave from KFUPM)

1975 – 1981 **Pakistan Institute of Nuclear Science & Technology – Islamabad, Pakistan**

Senior Scientific Officer

1971 – 1975 **Adelaide University – Adelaide, Australia**

Research Scholar

1968 – 1971 **Punjab University – Lahore, Pakistan**

Lecturer in Physics

## Teaching Philosophy

* Foster independent student learning to develop concepts, skills and attitudes enabling students to face real life situations
* Promote development of self-confidence and self-reliance through simulating concepts
* Promote critical thinking and analysis of complex material
* Provide a forum for qualitative unseen problems intended to simulate thought and to test the group of basic concepts, may provide a better evaluation of student’s performance in a course of study

**Publications in Refereed Journals**

1. I. Ahmed, S. Khalid, and **E.E. Khawaja** “Filament temperature of low power incandesecent lamps: Stefan-Boltzmann law”, Lat. Am. J. Phys. Educ. Vol. 4, 74 (2010).
2. M. F. Al-Kuhaili, **E. E. Khawaja** and. S. M. A. Durrani, “A method for the determination of the optical constants (*n* and *k*) of thin films with large optical inhomogeneities”, Journal of Modern Optics, 54, 1453 (2007).
3. M. F. Al-Kuhaili, **E. E. Khawaja** and. S. M. A. Durrani, “Determination of the optical constants (*n* and *k*) of inhomogeneous thin films”, Applied Optics, 45, 4591 (2006).
4. S. M. A. Durrani, **E.E. Khawaja**, and M. F. Al-Kuhaili, “CO-sensing properties of undoped and doped tin oxide thin films prepared by electron beam evaporation”, Talanta, 65, 1162 (2005).
5. S. M. A. Durrani, **E.E. Khawaja**, H. M. Masoudi, Z. Bastl, J. Subrt, A. Galikova, and J. Pola, “IR laser ablative structural modification of poly (1,4-phenylene sulfide): new desulfurization of aromatic compounds”, J. Anal. Appl. Pyrolysis, 73 (1), 145 (2005).
6. **E.E. Khawaja**, M. A. Al-Daous, S. M. A. Durrani, and M. F. Al-Kuhaili, “Chemical inhomogeneity in zinc telluride thin films prepared by thermal evaporation”, Thin Solid Films 485, 16 (2005).
7. S. M. A. Durrani, **E.E. Khawaja**, A. M. Al-Shukri and M. F. Al-Kuhaili, “Dielectric/Ag/dielectric coated energy-efficient glass windows for warm climates”, Energy and Buildings, 36, 891 (2004).
8. M. F. Al-Kuhaili, S. M. A. Durrani, and **E.E. Khawaja**, “Characterization of hafnium oxide thin films prepared by electron beam evaporation”, J. Phys. D: Appl. Phys., 37, 1254 (2004).
9. M. F. Al-Kuhaili, **E.E. Khawaja**, S. M. A. Durrani, and D. C. Ingram, “A study of thin films of V2O5 containing molybdenum from an evaporation boat”, Thin Solid Films, 460, 30 (2004).
10. J. Pola, J. Kupcik, S. M. A. Durrani, **E.E. Khawaja**, M. Masoudi, Z. Basil, and J. Subrt, “Laser ablative structural modification of poly(ethylene-*alt*-maleic anhydride), Chem. of Materials, 15, 3887 (2003).
11. M.F. Al-Kuhaili, S. M. A. Durrani, and **E.E. Khawaja**, “Optical properties of gallium oxide films deposited by electron-beam evaporation”, Appl. Phys. Lett., 22, 8123 (2003).
12. S.M.A. Durrani, M.F. Al-Kuhaili and **E.E. Khawaja**, “Characterization of thin films of a-SiOx (1.1 x  2.0) prepared by reactive evaporation”, J. Phys.: Condens. Matter, 15, 8123 (2003).
13. **E.E. Khawaja**, S.M.A. Durrani and M.F. Al-Kuhaili, “Determination of average refractive index of thin CeO2 films with large inhomogeneities” J. Phys. D: Appl. Phys., 36, 545 (2003).
14. A. Coban, **E.E. Khawaja** and S.M.A. Durrani, “Difference between bulk and film densities of metal oxide and fluoride films studied by NRA depth profiling techniques”, Nucl. Instum. Methods B, 194/2, 171 (2002).
15. M.F. Al-Kuhaili, S.M.A. Durrani, **E.E. Khawaja** and J. Shirokoff, “Effects of preparation conditions on the optical properties of thin films of tellurium oxide” J. Phys. D: Appl. Phys. 35, 910 (2002).
16. M.F. Al-Kuhaili, S.M. Durrani and **E.E. Khawaja**, “Effects of preparation conditions and thermocoloration on the optical properties of thin films of molybdenum oxide”, Thin Solid Films, 408, 188 (2002).
17. S M A Durrani, **E.E. Khawaja**, M A Salim, M F Al-Kuhaili, and A M Al-Shukri, “Effect of preparation conditions on the optical and thermochromic properties of thin films of tungsten oxide”, Solar Energy Materials and Solar Cells, 71, 313 (2002).
18. S. M. A. Durrani, A. M. Al-Shukri, A. Iob and **E.E. Khawaja**, “Optical constants of zinc sulphide films determined from transmittance measurements”, Thin Solid Films, 379, 199 (2000).
19. S. M. A. Durrani, **E.E. Khawaja** and A. M. Al-Shukri, “Density of thin films of cadmium sulphide by nuclear backscattering”, Arab. J. Sci. Eng., 25, 89 (2000).
20. M. A. Khan, M. A. Gondal and **E.E. Khawaja**, “A Gas Pressure Sensor Based on Zirconium Dioxide Thin Films”, Inter. J. of Electronics, 87, 277, (2000).
21. **E.E. Khawaja**, S. M. A. Durrani and A. M. Al-Shukri, “Simple method for determining the Optical Constants of Thin Metal Films”, Thin Solid Films, 358, 166 (2000).
22. M. A. Gondal, S. M. A. Durrani, and **E.E. Khawaja**, “Laser Induced Planar Voltage in Sn-doped Indium Oxide Films”, European Physical Journal “EPJ” (Applied Physics), 8, 37 (1999).
23. **E.E. Khawaja**, S. M. A. Durrani and M. A. Daous, “Depth Profiling of Inhomogeneous Zirconia Films by Optical and Rutherford backscattering Spectroscopic techniques”, J. Phys. D: Appl. Phys. 32, 388 (1999).
24. **E.E. Khawaja**, S. M. A. Durrani, and M. A. Daous, “Optical Properties of Thin Films of WO3, MoO3 and mixed-oxides WO3/MoO3“, J. Phys. Condens. Matter, 9, 9381 (1997).
25. S. M. A. Durrani, **E.E. Khawaja**, A. Coban, and M. A. Daous, “Study of Stopping Cross-section Factors of He Ions in Some Metal Fluoride Films”, Arab. J. Sci. Tech., 22, 175 (1997).
26. S. M. A. Durrani, **E.E. Khawaja**, J. Shirokoff, M. A. Daous, G. D. Khattak, M. A. Salim and M. S. Hussain, “Study of Electron-Beam Evaporated Sn-Doped In2O3 Films”, Solar Energy Materials and Solar Cells,44, 37 (1996).
27. Shirokoff J. and **E.E. Khawaja**, "Preferred Orientations in the Ge / SiO2 Interface", J. Mat. Sci. 31,2971(1996).
28. Khattak G. D., **E.E. Khawaja**, L. E Wenger, D.J. Thompson, M.A. Salim, A.B. Hallak and M.A. Daous, "Compositional Dependent Loss of Phosphorus in the Formation of Some Transition-Metal-Phosphate Glasses", J. Non-Crystal. Solids, 194, 1 (1996).
29. Khattak G.D., M.A. Salim, A.B. Hallak, M.A. Daous, **E.E. Khawaja**, L.E Wenger and D.J. Thompson, " Study of Valency States of Copper in Copper-Phosphate Glasses", J. Mat. Sci., 30, 4032 (1995).
30. **E.E. Khawaja**, S.M.A. Durrani, A.B. Hallak and M.A. Daous, "Measurement of Absolute Stopping Cross Sections by Backscattering in Thin Dielectric Films", Nucl. Instr. and Meth. B, 95, 153 (1995).
31. **E.E. Khawaja**, S.M.A. Durrani, F.F. Al-Adel, M.A. Salim and M.S. Hussain, "X-Ray Photoelectron Spectroscopy and Fourier Transform-Infrared Studies of Transition Metal Phosphate Glasses", J. Mat. Sci., 30, 225 (1995).
32. **E.E. Khawaja**, S.M.A. Durrani, A.B. Hallak and M.S. Hussain, "Density of Vapor-Deposited Amorphous Ge Films" J. Non-Crystal. Solids, 170, 308 (1994).
33. **E.E. Khawaja**, S.M.A. Durrani, A.B. Hallak, M.A. Salim and M.S. Hussain, "Density of Thin Vapour-Deposited Films of Zinc Selenide", J. Phys. D: Appl. Phys., 27, 1008 (1994).
34. **E.E. Khawaja**, F. Bouamrane, F.F. Al-Adel, A.B. Hallak, M.A. Daous and M.A. Salim, "Study of the Lorentz-Lorenz Law and the Energy Loss of 4He Ions in Titanium Oxide Films" Thin Solid Films, 240, 121 (1994).
35. M.A. Khan, **E.E. Khawaja** and M.F. Al-Kuhaili, "Collective Effects in the Ionization of Calcium Atoms Following Resonant Laser Pumping of 4s4p 3P1 Metastable State", J. Phys. D: Appl. Phys., 26, 1614 (1993).
36. **E.E. Khawaja**, F. Bouamrane, A.B. Hallak, M.A. Daous and M.A. Salim, "Observation of Oxygen Enrichment in Zirconium Oxide Films" J. Vac. Sci. & Tech., A 11, 580 (1993).
37. **E.E. Khawaja**, A.B. Hallak and M.A. Salim, "Observation of Surface Segregation in Sodium Germanate Glass Containing Cobalt" J. Non-Crystal. Solids, 152, 273 (1993).
38. **E.E. Khawaja** and F. Bouamrane, "The Determination of the Optical Constants (n,k) of Thin Dielectric Films", Applied Optics, 32, 1168 (1993).
39. M.A. Salim and **E.E. Khawaja**, "X-Ray Photoelectron Spectroscopy Study of Sodium Germanate Glass Containing Cobalt Oxide" J. Non-Crystal. Solids, 151, 71 (1992).
40. M.A. Khan and **E.E. Khawaja**, "Quasi-CW Laser Action Through Pulsed Laser Pumping of Metastable States in Dense Vapors", Optics Communications, 86, 386 (1991).
41. **E.E. Khawaja**, M.A. Khan and H.A. Al-Juwair, "Effect of Thermionic Emission on the Ionization of Calcium Vapour by Resonant Laser Light", Int. J. Electronics, 71, 991 (1991).
42. G.D. Khattak, V. Keith, Ph. Martin, **E.E. Khawaja**, and M.A. Khan, "Magnetization Studies of Ni-doped Vanadium Phosphate Glasses" J. of Mag. and Magnetic Materials, 94, 278 (1991).
43. M.A. Khan, **E.E. Khawaja** and H. A. AL-Juwair, "Ionization of Calcium Atoms Through Resonant Laser Pumping of 3P Metastable States", J. Phys. B Lett., At. Mol. Opt. Phys., 23, L 533 (1990).
44. **E.E. Khawaja**, F.F. Al-Adel, A.B. Hallak, M.M. Al-Kofahi and M.A. Saleem, "RBS and XPS Studies of Thin Glass Films Prepared By Laser Evaporation", Thin Solid Films 192, 149 (1990).
45. **E.E. Khawaja**, M.A. Khan, F.F. Al-Adel and Z. Hussain, "Laser Produced Reduction of Pentavalent Vanadium in Aqueous Solutions and V2O5 Powder" J. of Applied Physics 68, 1205 (1990).
46. Z. Hussain and **E.E. Khawaja**, "Investigation of Glasses by X-Ray Photoelectron and Auger Spectroscopy", Physica Scripta, 41, 939 (1990).
47. Z. Hussain, **E.E. Khawaja**, M.A. Salim, G.D. Khattak and O.B. Dabbousi, "X-ray Photoelectron Spectroscopy Investigation of Sodium-Ditellurate Glasses" Arab. Jour. Sci. and Eng., 15, 337 (1990).
48. Z. Hussain. M.A. Salim, M.A. Khan and **E.E. Khawaja**, "X-Ray Photo-electron and Auger Spectroscopy Study of Copper-Sodium-Germanate Glasses", J.Crystalline Solids, 110, 44 (1989).
49. **E.E. Khawaja**, M.A. Salim, M.A. Khan, F.F. Al-Adel, G.D. Khattak and Z. Hussain, "XPS, Auger, Electrical and Optical Studies of Vanadium Phosphate Glasses Doped with Nickel Oxide", J.Non-Crystalline Solids, 110, 33 (1989).
50. **E.E. Khawaja** and F. Al-Adel, "Optical Properties of Vanadium Doped Borate Glass", J.Mat.Sci. 23, 1391 (1988).
51. **E.E. Khawaja** and C.A. Hogarth, "The Optical Absorption Edge in Some Amorphous Semiconductors", J.Phys. C: Solid State Physics, 21, 607 (1988).
52. Shabbir Ahmed and **E.E. Khawaja**, "An Optical Film Thickness Monitor", Nucleus, 24, 17 (1987).
53. **E.E. Khawaja**, Z. Hussain, M.S. Jazzar and O.B. Dabbousi, "X-ray Photoelectron Spectroscopy Study of Vanadium-Germanate Glass", J.Non-Cryst.Solids, 93, 45 (1987).
54. M.S. Hussain, **E.E. Khawaja** and G.D. Khattak, "Optical and Infrared Studies of Sodium Ditellurate Glasses containing Chromium Oxide", Phys.Stat.Sol. (a) 97, 451 (1986).
55. **E.E. Khawaja** and G.D. Khattak, "The Optical Absorption Edge in Vanadate Glasses", Phys.Stat.Sol (a) 93, 621 (1986).
56. **E.E. Khawaja**, M.Sakhawat Hussain, M.A. Khan and J.S. Hwang, "Spectroscopic Electrical and EPR studies of Binary Semiconducting Oxide Glasses containing 50 Mole % V2O5", J.Mat.Sci. 21, 2812 (1986).
57. **E.E. Khawaja**, M.S. Hussain and M.N. Khan, "Spectroscopic and Electrical Studies of Sodium-Digermanate Glasses containing Iron Oxide", J.Non-Cryst.Solids, 79, 275 (1986).
58. S.M.J. Akhtar and **E.E. Khawaja**, "A study of the resistivity and the thermoelectric power of thin films of Sb and Bi", Phys.Stat.Sol. (a) 87, 335 (1985).
59. **E.E. Khawaja**, F. Tegally, J.S. Hwang, A.S.W. Li and A.A. Kutub, "Effect of Annealing on the Electrical and Optical Properties of V2O5 - GeO2 glasses", J.Mat.Sci.20, 3074 (1985).
60. **E.E. Khawaja**, M.N. Khan, A.A. kutub and C.A. Hogarth "Some Electrical and Optical Properties of Copper-Sodium-Phosphate Glasses", Int.J.Electronics, 58, 471 (1985).
61. **E.E. Khawaja**, M.A. Khan, M.N. Khan, A.S.W. Li and J.S. Hwang, "The electrical conductivity of sodium-copper-germanate glasses", J.of Mat.Sci.Lett., 3, 593 (1984).
62. S. Ahmed and **E.E. Khawaja**, "Refractive index of thin films of ZnSe in IR", Thin Solid Films, 112, L1 (1984).
63. A.A. Kutub, M.N. Khan, **E.E. Khawaja** and C.A. Hogarth, "The Control of electrical conductivity of germanium vandate glasses by the admixture or chlorine during preparation", J.Mat.Sci. 19, 1563 (1984).
64. M.N. Khan, **E.E. Khawaja**, D. Save, A.A. Kutub and C.A. Hogarth, "Electrical Conductivity of Semiconducting V2O5 - GeO2 glasses", Int.J.Electronics, 56, 395, (1984).
65. **E.E. Khawaja**, M.N. Khan and C.A. Hogarth, "Electrical Switching effects in Na2O/SiO2 glasses", Int.J.Electronics, 55, 303, (1982).
66. M.N. Khan and **E.E. Khawaja**, "The Electrical and Optical Properties of glasses of the Li2O-GeO2 and Na2O - GeO2 Systems", Phys.Stat.Sol (a) 74, 273, (1982).
67. M.N. Khan and **E.E. Khawaja**, "The Electrical and Optical Properties of Sodium Germanate Glasses", Jour. De Physique, Coll, C9, Suppl. 12, C9-319 (1982).
68. G. Leuchs, S.J. Smith, **E.E. Khawaja** and H. Walther, "Quantum Beats Observed in Photoionization" Optics Commun., 31, 313 (1979).
69. S.G. Tomlin, **E.E. Khawaja** and G.K.M. Thutupalli, "The optical properties of amorphous and crystalline germanium", J.Phys.C: Solid State Phys. 9, 4335, (1976).
70. **E.E. Khawaja** "The determination of the refractive index and thickness of a transparent film", J.Phys.D: Appl. Phys., 9, 1939, (1976).
71. **E.E. Khawaja** and S.G. Tomlin, "The optical properties of tantalum pentoxide and zirconium dioxide" Thin Solid Films, 30, 361, (1975).
72. **E.E. Khawaja** and S.G. Tomlin, "The optical constants of thin evaporated films of cadmium and zinc sulphides" J.Phys.D: Appl. Phys., 8, 581 (1975).

## Conference Presentations

1. **E.E. Khawaja,** “Preparation of dielectric films by physical vapor deposition (PVD): Problems faced and their remedies”, Third International Conference on Frontiers of Advanced Engineering Materials, Lahore, Pakistan, 2008.
2. **E.E. Khawaja,** “Characterization of thin films of a-SiOx (1.1 < x < 2.0) prepared by reactive evaporation of SiO”, International Chemistry Conference, Lahore College for Women University, Lahore, Pakistan, 2007.
3. **E.E. Khawaja,** “Some-Energy Saving Applications of Thin Solid Films”, Second International Conference on Frontiers of Advanced Engineering Materials, Lahore, Pakistan, 2006.
4. **E.E. Khawaja**, “Development of a numerical method of determining optical constants of absorbing thin films”, LUMS International Conference on Mathematics and its Applications in Information Technology, Lahore, Pakistan, 2005.
5. S. M. A. Durrani, **E.E. Khawaja**, and M. F. Al-Kuhaili, “Development of SnO2 thin film gas sensor for monitoring of CO”, Second Saudi Science Conference, Jeddah, Saudi Arabia, 2004.
6. A. M. Al-Shukri, S. M. A. Durrani, M. F. Al-Kuhaili and **E.E. Khawaja**, “Some energy saving applications of thin solid films”, First Saudi Conference: New trends for college of sciences in Saudi Arabia “ Conference on Creative Education and Industrial Research”, KFUPM, Dhahran, Saudi Arabia, 2001.
7. **E.E. Khawaja**, S. M. A. Durrani, M. F. Al-Kuhaili and A. M. Al-Shukri “Optically switchable thin solid films”, First Saudi Conference: New trends for college of sciences in Saudi Arabia “Conference on Creative Education and Industrial Research”, KFUPM, Dhahran, Saudi Arabia, 2001.
8. S. M. A. Durrani, **E.E. Khawaja**, M. F. Al-Kuhaili and A. M. Al-Shukri “Thin film sensors”, First Saudi Conference: New trends for college of sciences in Saudi Arabia “Conference on Creative Education and Industrial Research”, KFUPM, Dhahran, Saudi Arabia. Volume-Physics, 2001.
9. A. Coban, **E.E. Khawaja**, F. Z. Khiari, and S. M. A. Durrani, “Depth Profiling, of Thin Oxide Films and Electron Stopping Cross Section Measurements”, Sixteenth International Conference on the Application of Accelerators in Research and Industry, Denton, Texas, USA, 2000.
10. Coban A., M. A. Al-Daous, **E.E. Khawaja**, and S. M. A. Durrani, “Thin Film Depth Profiling, Straggling and Electron Stopping Cross Section Measurements”, Fourteenth International Conference on the Application of Accelerators in Research and Industry, Denton, Texas, USA, 1996.
11. **E.E. Khawaja**, "XPS and FTIR Study of Semiconducting Phosphate Glasses", the Pakistan Institute of Physics Annual Conference, Lahore, Pakistan, April 2-5, 1993.
12. **E.E. Khawaja**, "Thin Metal Oxide Films: Problems Associated with their use in Optics", FASAS (Federation of Asian Scientific Academies and Societies) Symposium on New Materials & Contemporary Applications, Islamabad, Pakistan, 1992.
13. M.A. Salim, S.M.A. Durrrani, F.F. Al-Adel and **E.E. Khawaja**, "XPS Study of 3d-Transition Metal Ions in Oxide Glasses" International Conference on Condensed Matter Physics and Applications, Bahrain, 1992.
14. **E.E. Khawaja**, "The Determination of the Optical Constants of Thin Absorbing Films: A New Method", International Conference on Condensed Matter Physics and Applications, Bahrain, 1992.
15. M.A. Khan, **E.E. Khawaja** and H.A. Al-Juwair, "Resonant Pumping of Intercombination Transition 4s2 - 4s4p 3P1 of Calcium", 22nd Meeting of the European Group for Atomic Spectroscopy, Upsala, Sweden, 1990.
16. Z. Hussain and **E.E. Khawaja**, "Investigation of Glasses By X-Ray Photoelectron and Auger Spectroscopy", Presented at Ninth International Conference on Vacuum Ultraviolet Radiation Physics, University of Hawaii, U.S.A., 1989.
17. M.N. Khan and **E.E. Khawaja**, "The Electrical and Optical Properties of Non-Crystalline Solids", Montpellier, France, July 1982, Journal De-Physique, Colloque C9, Supplement 9, Tome 43, 1982.
18. **E.E. Khawaja**, "Electrical Properties of Bi Films", Third Pakistan National Conference on Solid State Physics, Lahore, Pakistan, 1980.
19. **E.E. Khawaja**, "Optical Properties of Semiconductors", Symposium on Recent Advance in Physics, Punjab University, Lahore, Pakistan, 1980.
20. G. Leuchs, S.J. Smith and **E.E. Khawaja**, "Quantum Beats Observed in Photoionization from the 32P3/2 State of Atomic Sodium", DEAP Meeting of the American Physical Society, 1979.
21. S.M.J. Akhtar and **E.E. Khawaja**, "Fabrication and Calibratiuon of Nanosecond Response Time Thin Film Thermocouples", First National Electronic Conference, Islamabad, Pakistan, 1979.
22. **E.E. Khawaja**, "Determination of Optical Hand Gap and Electronic Transitions in Semiconductors", First National Electronic Conference, Islamabad, Pakistan, 1979.
23. **E.E. Khawaja**, G.K.M. Thutupalli and S.G. Tomlin, "Optical Properties of II-VI Compounds", First Australian National Congress on Physics, Adelaide, Australia, 1974.
24. **E.E. Khawaja** and S.G. Tomlin, "On the determination of Optical Properties of Thin Films", 4th Australian Vacuum Physics Conference, Canberra, Australia, 1973.

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