Dr. Julian James Bunn

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Education

- Ph.D. in Experimental Particle Physics, The University of Sheffield, England, 1983.
  Thesis title: "A Ring Imaging Cherenkov Detector and The Photoproduction Reaction $\gamma p \rightarrow \omega\pi^{\circ}(p)$"
- B.Sc. (Hons.) in Physics, The University of Manchester, England, 1980

Experience

- Senior Scientist, Center for Advanced Computing Research (CACR), Caltech, Pasadena, USA.1999-
- Visiting Faculty Associate, Department of Physics, Mathematics and Astronomy, Caltech, Pasadena, USA. 1997-1999.
- Project Leader (GIOD), European Laboratory for Particle Physics (CERN), Geneva, Switzerland. 1997-.
- Computing Coordinator (CMS), European Laboratory for Particle Physics (CERN), Geneva, Switzerland. 1996-1997.
- Project Leader (PAW), European Laboratory for Particle Physics (CERN), Geneva, Switzerland. 1995-1996.
- Project Leader (Computer Center), European Laboratory for Particle Physics (CERN), Geneva, Switzerland. 1991-1995.
- Section Leader (User Consultancy), European Laboratory for Particle Physics (CERN), Geneva, Switzerland. 1986-1991.
- Physicist/Programmer (ALEPH), European Laboratory for Particle Physics (CERN), Geneva, Switzerland. 1985-1986.
- Research Associate (UA1), Rutherford Appleton Laboratory, Oxford, UK. 1984-1985.
- Research Associate (NA24), Max Planck Institute for High Energy Physics, Munich, Germany. 1983-1984.

Research Interests

- Application of leading edge computing technology to solve challenging scientific problems.
- Use of large scale distributed Object Database Management Systems as technology to solve the complexity and data volume in the next generation of scientific experiments.
- Prototyping of distributed systems that deploy rule-governed and speculative clustering of data, and directed scientific knowledge discovery by autonomous mobile agents.

Current Research

- Co-I: GriPhyN "Grid Physics Network", NSF, Caltech, Wisconsin, Indiana, USC, Illinois, UCB, Pennsylvania, Harvard, FNAL, UCSD, SDSC, SLAC, ANL, Brownsville, Northwestern, LBNL, Johns Hopkins, 2000-.
- Co-I: "The Virtual Sky", with Dr. Roy Williams (Caltech), Prof. Tom Prince (Caltech), Prof . Alex Szalay (JHU), Dr. Robert Brunner (Caltech), Dr. Jim Gray (Microsoft), 2000-.
- Co-I: "Continuum Computer Architecture", with Dr. Thomas Sterling, Caltech, 1999-.

- Co-I: “Immersed Boundary Model of the Cochlea”, with Dr. Edward Givelberg, Ann Arbor, 1999-.
- Co-I: "Accessing Large Databases in Astronomy and Particle Physics", NSF/KDI, Caltech, Johns Hopkins University, 1999-.
- Co-I: "The Particle Physics Data Grid", DoE/NGI, 1999-.
- Co-PI: "GIOD - Globally Interconnected Object Databases", Caltech/CERN/Hewlett Packard joint project, 1997-1999.
- Co-I: "The Compact Muon Solenoid", CERN Large Hadron Collider experiment, ~135 institutes, ongoing.
- Co-I: "MONARC - Models of Network Architectures for Analysis at Regional Centres", Caltech, CERN, FNAL, Heidelberg, INFN, KEK, Marseilles, Munich, Orsay, Oxford and Tufts collaboration, 1998-.
- Co-I: RD45 “A Persistent Object Manager for HEP”, CERN.
- Several pending proposals, including “A Center for Data Intensive Science”, “A Lisp-based Beowulf Scientific Inference Engine”, “Distributed Simulation Infrastructure for K12 Education”, “Relational and Analysis Visualisation Engine”.

Selected Professional Service

- Application demonstrator at the Inet2000 conference, Yokohama, Japan, 2000.
- Participant at the joint EU-US Workshop on Large Scientific Databases, Annapolis, 1999.
- Member of the SLAC Computing Advisory Committee, Stanford, 1999.
- Presenter at the Internet-2 Distributed Storage Infrastructure workshop, Chapel Hill, 1999.
- Demonstrator at the Internet-2 Fall meeting, San Francisco, 1998.
- Member of the organizing Committee for the Interfaces to Scientific Data Archives workshop, Pasadena, 1998.
- Plenary speaker at the conference Computing in High Energy Physics, Berlin, 1997.
- Member of the organizing Committee for the HEPVIS scientific visualization workshop, CERN, 1996.
- Secretary of the report "Computing at CERN in the 1990s", CERN, 1991.

Publications

Selected papers in refereed journals

- Bunn, J; Collaborative Computing Environments for HEP - 1998. Publ. in Computer Physics Communications 110 (1998) 51-58.
- Bunn, J; A step towards light life cycle global hyperText. - 1994. Proceedings / Ed. by R Cailliau, F L Navarria and P G Pelfer Int. J. Mod. Phys., C : 5 (1994) 765-766
- Baud, J P et al.; SHIFT : The Scalable Heterogeneous Integrated Facility for HEP computing. - 1991. In the Workshop on detector and event simulation in high energy physics : Monte Carlo '91 Amsterdam, Netherlands ; 8 - 12 Apr 1991 . Publ. in: Proceedings K Bos and B van Eijl NIKHEF-K, Amsterdam, 1991 (41-56).
- Arnison, G et al.; Intermediate-vector-boson properties at the CERN Super Proton Synchrotron collider. - 1986. Publ. in Europhys. lett. : 1 (1986) - 327-345
- Qian, Z; Use of the ADAMO data management system within ALEPH. - 1987. Proceedings / Ed. by W Ash Comput. Physics Communications : 45 (1987) 283-298
- De Marzo, C; Prompt photon production in pi-p, pi+p and pp collisions at 300 GeV/c. - 1985. Proceedings, v 1 / Ed. by J Tran Thanh Van. - Ed. Frontieres, Gif-sur- Yvette, 1985. - 201-204
- Albrow, M G et al; A uranium scintillator calorimeter with plastic-fibre readout. - 1987. Publ. in Nucl. instrum. methods phys. res., A : 256 (1987) - 23-37
- Arnison, G et al; Recent results on intermediate vector boson properties at the CERN Super Proton Synchrotron collider. - 1986. Publ. in Phys. lett., B : 166 (1986) - 484-490
- Atkinson, M et al; A spin-parity analysis of the omega.pi0 enhancement photoproduced in the energy range 20 to 70 GeV. - 1984. Publ. in Nucl. phys., B : 243 (1984) - 1-28

- Davenport, M et al; A ring image Cerenkov detector for the CERN Omega spectrometer. - 1983. 29th Nuclear science symposium and 14th Symposium on nuclear power, Washington, 20-22 Oct 1982 IEEE Trans. Nucl. Sci. : 30 (1983)Proceedings - 35-39

Selected technical papers at conferences:

- Bunn, J; Newman, H; Wilkinson, Richard P.; The GIOD Project - 2000. Accepted paper at the International Conference on Computing in High Energy Physics: CHEP2000 Padua, February 2000..
- Bunn, J; Holtman, K; Scalability to Hundreds of Clients in HEP Object Databases - 1998. Proceedings of the International Conference on Computing in High-Energy Physics : CHEP'98 Chicago, USA; Sep 1998.
- Bunn, J; Newman, H; Wilkinson, R; Status Report from the Caltech/CERN/HP "GIOD" Joint Project - Globally Interconnected Object Databases - 1998. Proceedings of the International Conference on Computing in High-Energy Physics : CHEP'98 Chicago, USA; Sep 1998.
- Bunn, J; Object Databases for High Energy Physics. - 1998. Workshop on Interfaces to Scientific Data Archives, Pasadena, California; Mar 1998.
- Bunn, J J; A user friendly interface to VMS disk quotas. - 1987. DECUS Europe technical paper, Rome, 1987.

Magazine articles

- Bunn, J; Sound on the PC - 1995. Publ in "Speaker Builder" magazine 8/95.
- Bunn, J; AIRR - Anechoic and In Room Response - 1994. Publ in "Speaker Builder" magazine 8/94.

Software:

- VirtualSky: a prototype Java applet for viewing and navigating astronomy sky survey data including DPOSS, 2MASS.
- JavaCMS: a Java-3D/JFC/Objectivity based tool for viewing fully simulated particle physics events in 3 dimensions.
- CMSOO: A complete pattern recognition and analysis prototype for simulated particle physics data from the CMS detector.
- ModNet: a tool for modelling the performance of arbitrarily complex computing tasks running in systems of Wide Area Network and Local Area Network distributed CPU and disk servers.
- Floppy and Flow: Public domain Fortran code source parser, convention checker, tidier, HTML converter, flow chart generator. Available from www.netlib.org/floppy/.
- AIRR and WinAIRR: Commercial PC-based software for measuring the frequency response of loudspeaker systems using MLS and pulse-based excitation with fast Fourier and Hadamard transforms and spectral analysis. Available from Old Colony Sound Laboratory, Peterborough, NH.

Professional Affiliations

- Member of the Audio Engineering Society
- Proposed as Fellow of the Institute of Physics

Biographical sketch

Dr. Julian Bunn has been researching in scientific computing, especially High Energy (Particle) Physics, since 1985. He was born in England in 1959, and educated at the University of Manchester, obtaining a B.Sc.(Hons) in Physics in 1977, and then at the University of Sheffield, where he obtained his Ph.D. in Experimental Particle Physics in 1983. He was then appointed as a Research Associate at the Max Planck Institute for High Energy Physics in Munich, Germany.

This was followed by a position as a Research Associate at the Rutherford Appleton Laboratory in Oxford. In 1985 he was offered, and accepted, a staff position at the European Laboratory for Particle Physics (CERN) in Geneva. While at CERN, Dr. Bunn held several positions as Project Leader and Section Leader in the Information Technology Division, and played leading IT roles in several physics experiments.

In 1996, he instigated, and became co-Principal Investigator (with Prof. Harvey Newman) of the "GIOD" joint project between Caltech and CERN, an effort funded by Hewlett-Packard. The project investigated the use of Object Oriented software, commercial Object Databases and mass storage systems as solutions to the PetaByte storage needs of the next generation of particle physics experiments. To carry out this project, Dr. Bunn took Special Leave of Absence from CERN to work at Caltech. He collaborated closely with Caltech's Center for Advanced Computing Research (CACR) who then appointed him as a Staff Scientist in 1999.

Some of Dr. Bunn's recent work has involved the design and implementation of a scheme for populating an Object Database with ~1 TeraByte of physics data, using SMP servers and clusters of NT workstations. He has developed C++ and Java/3D/JFC applications that run against the database (featured at the Fall '98 "Internet-2" meeting), measured scalability and deployment issues, and evaluated the Object Database performance on Caltech and JPL's 256 CPU Exemplar system, using numerous distributed clients. This work then focussed on modeling the system behavior to produce scaling predictor algorithms, with special emphasis on the WAN aspects of the systems, and development of sophisticated event viewers based on Java 3D. The event viewers interact directly with the Object Database to access and render the complex event structures typical of particle physics. More recent work includes simulation of the Cochlea, development of the VirtualSky SQLServer database and client applets, simulation of the Continuum Computer Architecture, network performance tests for replication of large ODBMS databases, and consultancy in the design of a simulation architecture for K12 learning.