Nathan Isgur 1947–2001

As reported briefly in *CERN Courier* (September p41), Nathan Isgur, a distinguished theoretical physicist who made landmark contributions to the physics of quarks in hadrons, died on 24 July. For several years he had been fighting multiple myeloma—a rare cancer of the bone marrow. Isgur was chief scientist of the Thomas Jefferson Accelerator Facility at Newport News.

Born on 25 May 1947 in South Houston, Texas, Isgur went to Caltech for his undergraduate education, intending to major in molecular biology. However, exposure to the Feynman Lectures and Feynman himself, and a poor memory for chemical names led Nathan to switch to physics, obtaining a BSc in 1968.

He went to Toronto for a PhD, obtaining his degree in 1974, and avoiding the war in Vietnam. He was appointed a member of the Toronto faculty in 1976. Isgur was a superb teacher and lecturer, and many of his undergraduate and graduate students now have faculty positions at US and Canadian universities.

At Toronto he collaborated with Gabriel Karl of Guelph on the physics of baryons in the quark model. The QCD-improved quark model for baryons was very successful and is still the benchmark for baryons.

During various leaves at Oxford, Isgur collaborated with Jack Paton on flux-tube models for gluons in hadrons. Their model made predictions for new excited hadrons involving gluonic excitation, which still remain to be confirmed. In another notable collaboration, with Chris Llewellyn Smith, the applicability of perturbative QCD to exclusive processes was examined in detail.

Isgur’s most celebrated work was with Mark Wise at Caltech, one of his former undergraduate students. Their study of semileptonic decays of heavy mesons containing charm or beauty quarks led to the discovery of heavy quark symmetry in QCD. This symmetry, which becomes exact in the limit of infinite quark mass, allows an economical description of many heavy meson decays. Two of their seminal papers each have more than a thousand citations on the SPIRES database at SLAC. The discovery also led to the award of the 2001 American Physical Society J.J. Sakurai prize to Isgur, Wise and Mikhail Voloshin.

In 1990 Isgur moved from Toronto to Jefferson Lab to assume leadership of the theory group. He was attracted both by the opportunity to build a new theory group, and to guide the experimental programme of the new facility. Simultaneous with his appointment at the lab, he joined the faculty at the College of William and Mary.

At Jefferson Lab, Isgur initiated a programme to strengthen ties with the local and regional nuclear physics groups. Through joint appointments with local universities, he was able to double the number of positions in the theory group. Following this success, the lab extended the approach to joint experimental appointments. Isgur also instituted a programme of bridged positions, which allowed universities to recruit bright, young nuclear physicists for positions a few years before the incumbents retired.

These two programmes resulted in more than 60 new nuclear physics faculty positions in the south-east of the US. He devoted a great deal of effort to these programmes and was very pleased when they were imitated elsewhere. Isgur was strongly concerned to keep the Jefferson experimental programme focused on key issues and often asked experimentalists: “What new physics will we learn from this experiment?”

He was very effective in these interactions because of his ability to express new physics ideas in simple terms. This, as well as his skill in creating enthusiasm for physics in a non-technical audience, was a great asset in meetings with policymakers and funders.

In recognition of his contributions, Isgur was appointed chief scientist of the lab in 1996.

When Isgur’s illness was diagnosed, he started to publish at an accelerated rate. He published some 10 papers in refereed journals in the last four years and left about seven preprints in process of publication.

During his last two years at the lab he established a collaborative lattice QCD effort with MIT. This involved the addition of two new staff members to the theory group as well as substantial prototype computing hardware.

Isgur was extremely committed to assuring a bright future for the laboratory’s experimental programme through his constant efforts on behalf of the 12 GeV upgrade project and the proposal for a new experimental facility to search for exotic states involving gluonic excitation.

He was a fellow of both the American Physical Society and the Royal Society of Canada, and he received many honours both in Canada and the US.

Those of us who knew Nathan Isgur have lost a very special friend and physics has lost a great leader and teacher.

*Gabriel Karl, Guelph, and John Domingo, Jefferson Lab.*