

Physics is the fundamental discipline which underpins the other scientific branches, and the SRS and its predecessor the Synchrotron Radiation Facility (SRF) attached to the 5 GeV electron synchrotron NINA at Daresbury made major contributions to this area during their 38 year lifetime. It is the research carried out at the SRS which forms the major part of this site, but many of the techniques used and the new areas of research started were initiated on the SRF, which closed in 1977. The SRS, with its much greater brilliance and intensity, built on earlier work but in its own right developed new and sophisticated techniques, as well as opening up new areas of research. Many of the experimental programmes being carried out worldwide, including the UK, similarly owe their origins to work started at the Daresbury SRS.

In terms of pure physics, photoemission used in the study of solids or surfaces, also called photoelectron spectroscopy when applied to the study of atoms and molecules, made substantial advances to our understanding of electronic structure. The SRS was the first to use ion spectroscopy to make absolute cross section measurements of ions, a technique which was widely copied at other SR sources. As a result of the enhanced intensity available from the SRS, coincidence techniques became possible, further advancing our knowledge of the ways in which molecules break up when irradiated. Fluorescence spectroscopy, in particular time resolved, led the way to a detailed analysis of the dynamics of molecular interactions, and this technique along with coincidence experiments found many applications in photochemistry.

The peak intensity of the SRS spectrum was in the soft X-ray region, ie 3-20keV photon energies, and it is here that the scientific output flourished when compared with earlier sources such as the NINA SRF. The standard physics techniques of X-ray diffraction and X-ray scattering were used to carry out experiments in all scientific disciplines, experiments which could only be dreamt of on earlier light sources. In this way knowledge of the structure of materials advanced and led to the discovery of new materials with a wide range of applications in engineering and industry.

X-ray diffraction and scattering were used extensively in the biology field; in particular protein crystallography made considerable advances since a wider range of protein crystals, many of which could only be grown in very small sizes, were now accessible to experiment. The biological work will be covered in a separate section, but it is worth noting here that during its lifetime the SRS pioneered the new instrumentation and data analysis techniques required.