is extremely large and presents difficulties in the analysis of data. A programme for the analysis of double decay processes in the decay of nuclear levels has been written in the Real Time Fortran language for the off-line analysis of data in a CAE 9040 computer.

The system was electronically tested for linearity, time resolution, stability etc. For the measurements of a double gamma decay in which two coaxial Ge(Li) detectors were applied, a calibration of the system was made by Compton scattering of gamma rays from one detector into another. The time difference between the pulses from the two detectors was recorded in one channel and the amplitudes of the pulses in the other two channels. The calibration measurements yielded a straight line in the amplitude 1 — amplitude 2 diagram, since a continuous distribution of energy deposited in each detector was obtained (due to the variation of the scattering angle), with the condition of a constant sum. The same applied in the case of double decay. A detailed investigation of the time spectra (time dimension) along the constant sum line was made. When one amplitude increases the other decreases, and this causes shifts (of about 30 ns) of the time distributions. A considerable improvement of the time resolution was obtained when corrections for these shifts were introduced in the analysis of data, depending on the channel numbers of amplitude 1 and amplitude 2.

2.8. Automatic analysis of the gamma radiation spectra

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2.9. The short dead time of halogen parallel plate counters

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Introduction. The investigation of properties of halogen (Ne-Br_2) parallel plate counters of the Srdoč type[1] revealed the possibility of constructing counters with a dead time shorter by an order of magnitude than that of cylindrical GM counters.

In general, the decrease of the impedance connected to the counter causes the reduction of the dead time. The dead time of parallel plate counters with low impedance (300 kΩ) and the pressure ratio $P_{Ne} : P_{Br2} = 100$ is short, less than 10 μs. In particular cases, if P_{Br2} is 1.2 torr and the distance between the electrodes 3 mm, the dead time is 6 μs.

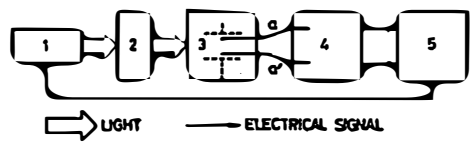

Fig. 1.

To explain this phenomenon, the discharge in the counter caused by gamma or beta particles was measured using the experimental setup described below.

Experimental setup. The setup used in the present measurement is shown in Fig. 1. The circuit with the discharge tube is labelled by (1). The optical system (2) produces the image (3) of the light pulse emitted between the electrodes. The light from two different spots of the image (3) is conducted by means of two plastic light guides »Crofon« (a and a') to the cathodes of two RCA IP28 photomultipliers (4). The photomultipliers are connected to an oscilloscope (Tektronix 551) through two cathode followers (4). The time bases of the scope are triggered by the voltage pulse from the discharge tube.

Measurements and conclusion. The described method is a suitable tool for investigating the place and time dependence of the discharge ($I = I(t, x)$.) It was observed that a low intensity light pulse near the anode appeared first, followed by a high intensity light pulse near the cathode (Fig. 2). The time delay between these two light maxima decreased with increasing electrode voltage. The time delay was of the order of 100 nsec.

The light guides used can transmit only wave lengths corresponding to the deexcitation of neon ($3p$—$3s$) levels.

Light pulses from the discharge tube indicated that the density of the space charge was increased near the anode. The U. V. emission of neon and bromine (for $\lambda < 275$ nm) caused the secondary emission of electrons at the cathode. The electrons thus produced gave rise to an intense development of new avalanches near the cathode, followed by an increase in density of the space charge in this range.

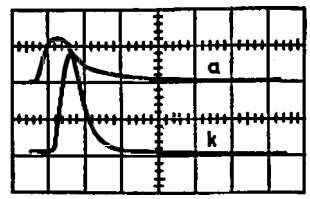

Fig. 2.

The dead time is defined by recombination of slow-mobility positive ions. In a cylindrical counter the discharge is developed mainly in the centre of the tube near the anode. The dead time of such a counter is longer in comparison with that of a parallel plate counter. One of the properties of the latter counter is that positive ions are concentrated near the cathode.

Reference

1) D. Srdoč: Nucl. Instr. and Meth. 21 (1963) 243.

2.10. Acceleration of nitrogen and neon ions to energies above 200 MeV/nucleon

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Until recently the scientific interest for heavy ions was more or less limited to energies below 10 MeV/nucleon. This range of energies was of special interest for nuclear physicists with their desire to explore problems of nuclear structure