

MEMORANDUM

To : ISOLDE Experiments Committee

From : K.-L. Kratz (Spokesman of Experiment P34)

Subject : Request for beam-time

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In February 1996, in our Addendum to experiment IS333 (P34 Add.1) we had reported about electronic problems induced by the operation of the gas-discharge lasers, and had given some ideas concerning possible improvements in Z-selectivity. Before allocating further shifts, in document CERN/ISC 96-8 the ISOLDE Experiments Committee had requested a report on the improvements discussed in this Addendum.

**Improvements in Z-Selectivity**

We will not report here in detail about the laser ion-source tests performed during the winter shut-down period. A summary will be given at the next ISOLDE Meeting by H.L. Ravn. However, we just want to mention two main results:

- As envisaged, a more powerful CV-laser tube has been installed which increased the ionization efficiency and selectivity by a factor of two.
- Ion-beam time structure measurements showed that within a gate of 17  $\mu$ s it is possible to extract about 80 % of the Ag ions. With this technique, the Ag/In ratio may be improved by a factor of four.

**Electronic Tests**

The  $\gamma$ -measurements performed during our experiment in June 1995 were strongly disturbed by electronic noise from the unshielded lasers. The pulsing of the lasers induced a high random count-rate which overloaded our crate controller and made the collection of list-mode data impossible. To investigate this problem, several tests were performed at CERN/ISOLDE and in Mainz.

Procedure at CERN (March 1996):

- The laser-induced signals (ca. 11 kHz pulsing) can clearly be seen at the output of the Ge-preamplifier.
- The signals are strongly amplified by the TFA.
- On the other hand, the signals are suppressed by the main amplifier due to its longer integration time.
- To prevent the CFD to be triggered by the laser noise, the lower level discriminator had to be set on a very high value (corresponding to a  $\gamma$ -energy of approximately 300 keV).

- A trigger signal from the lasers was used, which was created by dividing the thyatron high-voltage. This signal rises up to 20V and has a strong undershoot. Nevertheless, it can be used to trigger the optocoupler built into our Gate & Delay-Generator.
- In order to gate the CFD, the TTL output had to be inverted. This was performed with a LA8000 level adapter. With this, the random pulses were eliminated.
- Now, the LLD of the CFD can be set on reasonable values (corresponding to a  $\gamma$ -energy of roughly 15 keV).
- As an optimum choice for the G & D settings, we obtained a delay of 0,5  $\mu$ s and a gate length of 3,5  $\mu$ s.

#### Further Tests:

- Replacing the normal preamplifier cable by a shielded one resulted in a reduction of the laser induced signals by about 40 %.
- The disturbance was found to depend also on the position of the detectors: It seems to be strongest near the floor, and close to the laser barrack (i.e. at beam-line GLM).
- Any electrical connection between beam-line and detector amplifies the disturbance.
- Any cable, in particular cable loops, act as antenna.

#### Further procedure:

- We will prepare in Mainz a second G&D-generator with an optocoupler built in.
- We will prepare in Mainz shielded preamplifier cables for the Ge-detectors.
- V.I. Michin plans to supply us with a TTL output signal of the frequency generator, which triggers the thyratrons. This signal is about 1,5  $\mu$ s earlier than the signal from the thyatron high-voltage used so far.
- V.I. Mishin mentioned that the newly installed CV-laser should have a better EM-shielding than the old one.

#### Summary:

By using the laser trigger-signal for setting up an anti-coincidence in our CFD, we succeeded to completely suppress the collection of random pulses induced by the gas-discharge lasers. With this, we seem to have solved the main electronic problems. Hence, even when using the GPS instead of the requested HRS, at least the  $\gamma$ -measurements up to  $^{128}\text{Ag}$  proposed in P34 Add.1 can be performed at a position not too close to the laser barrack, e.g. at beam-line LA1.

We ask the committee to allocate 10 out of the requested 30 shifts for an experiment in Oct. 1996, in beamsharing mode with the 9 shifts foreseen for the solid-state experiment IS345 (P65 Add. 1).