general definition of an ion, this statement was wrong. Several years before this Prof. Dehmelt's group had successfully injected positrons from an external source into a Penning trap [34]. They used radiative damping, off-axis injection, and magnetron drift enhancement of the bounce time in the trap before the 'ion' reached the entrance hole again to stabilize the particles. The efficiency of this process was only 3 in 10^{10}, which was quite sufficient for their purpose, and is still very competitive today for direct injection of positrons into a Penning trap. In the same year as the "first" in-flight capture of ions C. Surko had trapped positrons in a Penning type trap using buffer gas collisions to cool the positrons [35].

What is new in 'in-flight capture' is the fact that this method is more general since it does not require active cooling of the particles during the time they are traversing the trap volume, but is rather done by dynamically altering the trap potential while the particles are inside. In the true sense of the word one should only call this type of device a trap, while everything else really is a "cage". As a matter of fact, the early German literature always referred to "Käfig" rather than to "Falle", thereby recognizing the true operation of the device as a confinement system, not a catching system.

5.1.1. Injection of Radioactive Isotopes into the "ISOLTRAP"

The ion storage technique had so far not been used for the study of nuclear properties such as the determination of masses and moments for short lived isotopes, since these rare species had to be produced outside the trap system, cooled, eventually mass separated, and then guided with high efficiency into the trap. This was accomplished for the first time by the ISOLTRAP collaboration using an intermediate collection device in the form of an implantation foil, situated slightly inside the electrodes of a first, large volume, collection trap [33]. These foils are bombarded with a mass separated beam from the ISOLDE on-line mass separator, and, once loaded sufficiently heated to re-evaporate the ions into the collection trap. Here they are cooled using collisions with a buffer gas and then ejected as a defined bunch towards a second trap, the measurement trap. The voltage on the electrodes of this second trap is switched on at a time determined by the mean ion energy and the distance between collector and measurement trap, when the ions are inside the trap volume. To avoid spatial growth of the ion bunch during the transfer, the transfer time is minimized by accelerating the ions to approximately 1 keV and then decelerating them again at the entrance of the second trap. An overall efficiency of this method of 10^{-4} was reported, with inter trap transfer efficiencies as high as 70%. At the time, this method was only