2. The Underlying Principle.

The origin of this entire field can be sought in the observation that Heisenberg's Uncertainty Principle $\Delta E \times \Delta T \geq h/2\pi$, (with ΔE being the uncertainty in the energy measurement (or definition) of an atomic transition, ΔT being the interaction time or observation time, and h being Planck's constant) simply states, that precise measurements require a long time. At the same time, for utmost precision, one desires to study an isolated system which is undisturbed by other systems surrounding it. This observation prompted Prof. Dehmelt to define the goal of obtaining a " individual particle freely floating space" [2] and embark onto the endeavor of using ion traps for precision measurement.

At the same time, an infinitely long confinement time will also allow to observe the intrinsic life time of the system, i.e. life times of metastable states or radioactive isotopes, chemical reaction times, and others. Also, the "isolation" of the particle from its environment allows a specific selection of collision partners for the study of charge exchange processes and chemical reactions, and only due to a nearly complete avoidance of reaction partners the trapping of highly charged ions as well as antimatter has become possible.

According of the picture of the field as a tree, I will develop in section 3 the roots of the ion trap development. In section 4 I will explore the "trunk" of our tree, which I define as such an area of experiments where both the long confinement times as well as the complete isolation of the particles is of significance to the results obtained. As a main example I will discuss the measurement of the electron magnetic anomaly. Section 5 discusses a few of the branches (those areas, where only one of the underlying principles is used). This area is exemplified by discussions of the external injection of charged particles into traps and by a brief description of a recent proposal to extend the use of Penning traps to extreme dense plasmas for power production via fusion. Finally a short summary and acknowledgments are given.

3. The Early Development.

3.1. The Radio Frequency Quadrupole Trap.

Based on earlier development on linear radio frequency quadrupole mass filters [3,4] Prof. Wolfgang Paul, H. P. Reinhard, U. v. Zahn, [5] and E. Fisher [6] describe