electrons in this discharge are polarized by spin-exchange with the sodium atoms, which have been polarized by optical pumping. Upon application of the proper RF drive this electron polarization changes, and these changes are detected by their effect on the sodium polarization and therefore the absorption of polarized light from the sodium lamp. The result obtained gives the ratio of the sodium magnetic moment to the magnetic moment of the electron as $g_J/g_s = 1.000026 \pm 0.00003$. Since the magnetic moment for sodium atoms was known to a better accuracy, a value for the anomaly of the electron of $a_e = 0.001116(40)$ could be extracted, making this the first experiment in a long chain to improve the accuracy of this number by many orders of magnitude. A more detailed technical report on this important measurement can also be found in reference 13.

An extension to this method was employed by G. Gräff and his co-workers [14]. Here, for the first time, a Penning trap was utilized to store electrons at electron volt energies. These electrons were polarized by spin exchange reactions with a sodium beam from an oven which was spin polarized by passing through a hexapole magnet. The beam polarization was monitored by passing the beam through a second hexapole after it had traversed the trap. In this configuration it was not possible to monitor the electron polarization by a change of the beam polarization since the decrease in beam intensity on the detector would have been minute and not detectable in the thermal noise. Instead the spin dependence of the inelastic collision cross section for excitation of the sodium atoms by electron impact was utilized to arrive at a measurement of the electron polarization. For a fully polarized electron sample these inelastic collisions led to a certain low average energy of the electron cloud. When now the proper RF drive was applied to the electrons and their polarization was destroyed this cooling mechanism became less effective, the electron kinetic energy increased, and thereby the signal observed in an external tank circuit tuned to the axial frequency of the electrons. By slowly stepping across the ω_a resonance and averaging the signal height over several measurements the anomaly transition could be mapped out. This experiment was repeated for a variety of trapping potentials to account for the slight dependency of the anomaly transition on the electric field, and a value for $a_e = 0.00115966(30)$ could be reported. This value was reported as preliminary result, since many improvements to the experimental set-up had been developed, like the "flop-in" detection method for the atomic beam by using a Stern-Gerlach magnet as polarizer and a hexapole as analyzer [15], or a method to extract the electrons through an inhomogeneous magnetic field to directly detect their polarization [16], and furthermore the present value could not yet rival the results achieved in a non-trap experiment by A. Rich's group in Michigan [17] or the theoretical accuracy of 5×10^{-9}