DISSERTATION

Cool Science

ausgeführt am Atominstitut

der Technische Universität Wien
Fakultät für Physik

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Chapter about beam characterization.

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Measurement Ablenkungsgeschwindigkeit (frequency) -> Alex

1.1 Aluminum foil

In fig. 1.1 the inside of the 6-way cross of the first iteration is shown. On one side of the phosphor screen, aluminum foil was attached to simulate the aquadag coating inside a CRT. The beam was deflected on the aluminum foil and the BNC output was connected to ground through an ammeter to measure the beam current. As shown in fig. 1.2 there is close to no difference in the filament voltage (and therefore heating power) between an opened and sealed CRT while the beam current on the aluminum foil varies widely. One possible reason could be that electrons scatter around and not all choose the wire path to ground. Therefore a Faraday cup (see section 1.2) was used in the second iteration.

explain in basic what aquadag

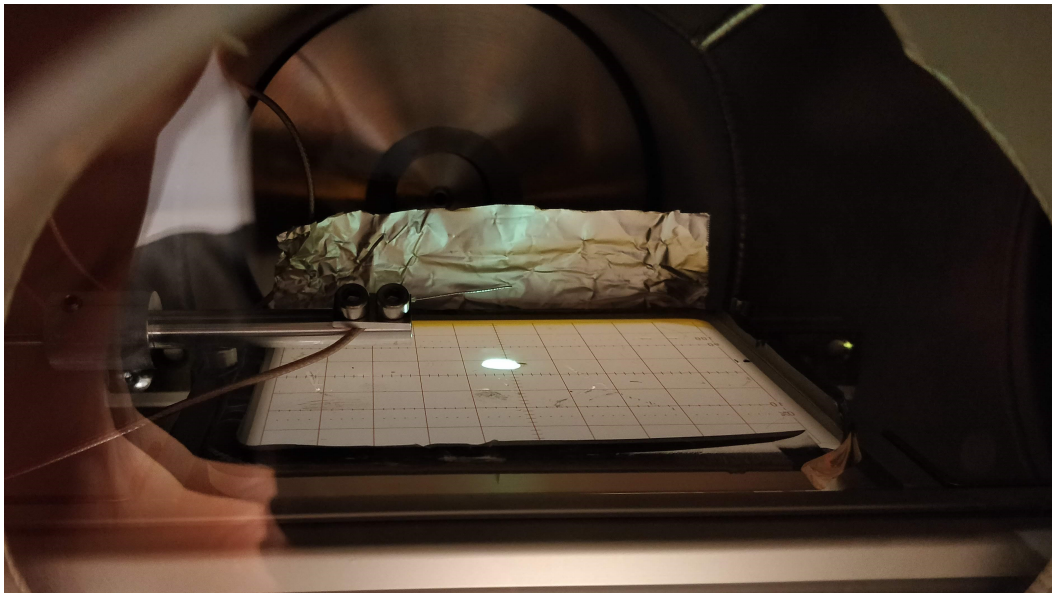

Figure 1.1: Front view of vacuum chamber (first iteration).

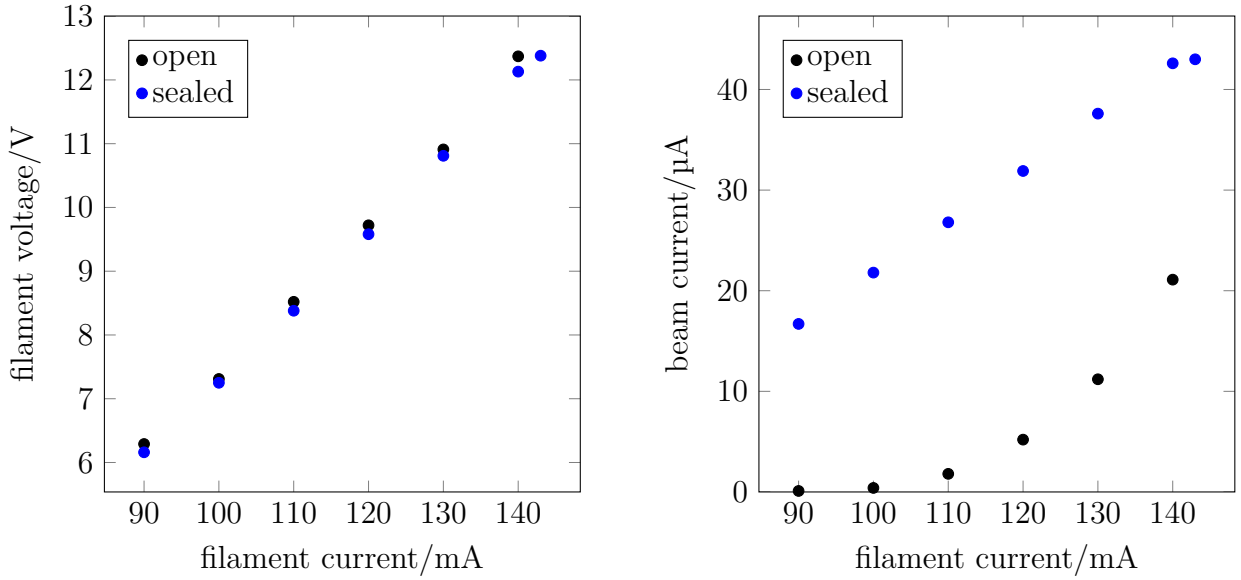

Figure 1.2: Difference in filament voltage and beam current between an open and sealed CRT.

figure size, overfull hbox

1.2 Faraday cup

In order to accurately measure the beam current, a Faraday cup was built. A schematic is shown in **??**. A copper tube was cut at an 45° angle on one side and a Cu-sheet was soldered at the top and bottom. A small hole was drilled at the top and a coaxial cable was attached on the mantle which connects to a BNC feedthrough at the top of the chamber. The small opening and bent floor were made in order to reduce backscattering as indicated by blue arrows. At the top surface a phosphor coating was applied in order to make the beam visible which made it easier to guide it into the opening hole.

With this improved setup, the beam current was measured again. A summary is shown in **??**. It can be seen that a current of over 300 µA was achieved, which is more than the necessary amount for the experiment. A problem is the fact, that the current is not stable. A measurement on the next day under the same settings resulted in a current between 50 µA to 120 µA.

Todo list