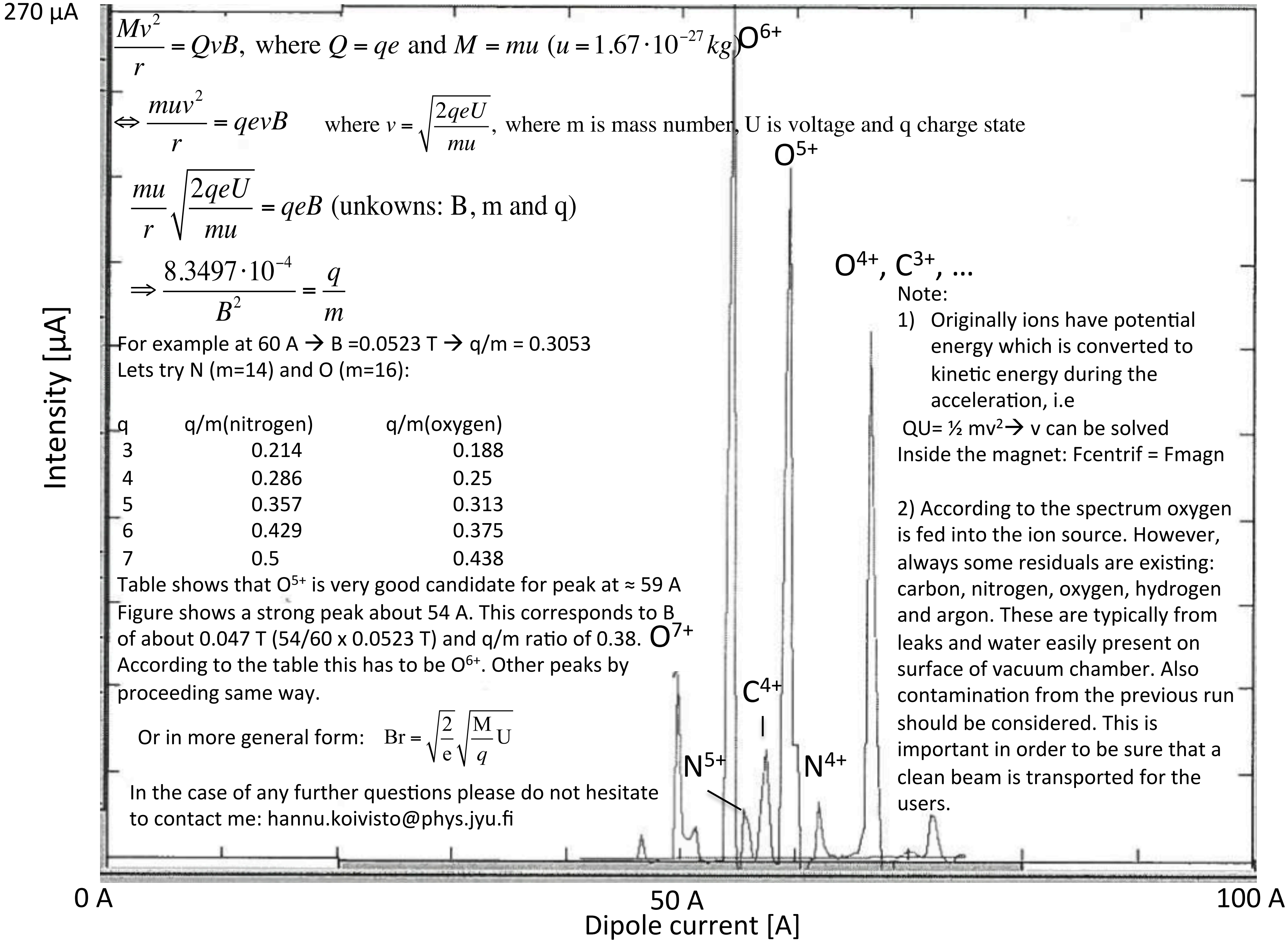
Analyzed spectrum



$$\frac{Mv^2}{r} = QvB, \text{ where } Q = qe \text{ and } M = mu \ (u = 1.67\cdot 10^{-27}\,kg)$$

$$\Leftrightarrow \frac{muv^2}{r} = qevB \quad \text{where } v = \sqrt{\frac{2qeU}{mu}}, \text{ where m is mass number, U is voltage and q charge state}$$

$$\frac{mu}{r}\sqrt{\frac{2qeU}{mu}} = qeB \text{ (unkowns: B, m and q)}$$

$$\Rightarrow \frac{8.3497\cdot 10^{-4}}{B^2} = \frac{q}{m}$$

For example at 60 A → B =0.0523 T → q/m = 0.3053

Lets try N (m=14) and O (m=16):

q	q/m(nitrogen)	q/m(oxygen)
3	0.214	0.188
4	0.286	0.25
5	0.357	0.313
6	0.429	0.375
7	0.5	0.438

Table shows that O^{5+} is very good candidate for peak at ≈ 59 A

Figure shows a strong peak about 54 A. This corresponds to B of about 0.047 T (54/60 x 0.0523 T) and q/m ratio of 0.38. According to the table this has to be O^{6+}. Other peaks by proceeding same way.

Or in more general form: $\mathrm{Br} = \sqrt{\frac{2}{e}}\sqrt{\frac{M}{q}U}$

Note:

1) Originally ions have potential energy which is converted to kinetic energy during the acceleration, i.e

QU= ½ mv^2 → v can be solved

Inside the magnet: Fcentrif = Fmagn

2) According to the spectrum oxygen is fed into the ion source. However, always some residuals are existing: carbon, nitrogen, oxygen, hydrogen and argon. These are typically from leaks and water easily present on surface of vacuum chamber. Also contamination from the previous run should be considered. This is important in order to be sure that a clean beam is transported for the users.

In the case of any further questions please do not hesitate to contact me: hannu.koivisto@phys.jyu.fi