Metal Jet in a High Magnetic Field

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videoconference, targetry session
Grenoble High Magnetic Field laboratory (setup)

• mercury jet
• d_{nozzle} = 4 mm
• colinear/inclined injection
• v_{jet} \leq 12 \text{ m/s}
• B-field up to 20 Tesla
Setup Arrangement

- Observation area
- Calibration grid
- nozzle
- Ideal mercury jet

We only look at data from 4.Akt, June 2002, 20 Tesla solenoid

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In/Output variables

- B-field ≤ 20 Tesla
- Driving pressure ≤ 75 bar
- Nozzle position
- Nozzle type 0°/6° (short/long)
- Observation distance ≤ 20 cm
- Jet/surface velocity
- Jet inclination
- Jet offset
- Jet width
Jet traverses $B_{\text{max}}$

This qualitative behaviour can be observed in all events.
Long/Short nozzle at B=0

Short nozzle: so messy, it can not even be stabilised by a magnetic field.

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Qualitative observation:

- jet are smoothed by the magnetic field
- tip gets like a torpedo
- jet gets very stable

Can we put this into numbers?
Digital Image Processing

• Using Mathematica (lasts forever, but it works)

• Look at the few examples on the next pages
Calibration

From the original picture the position of the grid lines is extracted ➞

Resolution $\Delta x \approx 0.33 \text{ mm}$
Jet Shape

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Typical Final Output

Event 092

Upper/Lower border of jet

width of jet

offset of jet

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Tip velocity

Manually measured: reliable, but without error bar
• As I could not prepare all data in time, we will see each other in two weeks from now
• Then we have look together at the final data