Example presentation

Illustration of a concise update

Web scripting

A brief wade into useful tool

Guidelines on presentation

This is targeting a "quick research progress update", ie round-table.
A presentation at a symposium or seminar is different.

Guidelines on presentation

Clear, concise, and no BS.

1). Remind what you are doing, or what the previous question was.
2). Remind how you are doing it.
3). Say what you did
4). Say, or show, how you did it.
5). Show the data results
6). State what you can conclude, but don't overreach.
7). Note new questions that have arisen.
8). Propose next steps.

Guidelines on presentation

Prepare it, don't wing it.
It could be only verbal, ie an elevator speech. (1 minute)
It could be a walk through of your conclusion logbook entry. (<5 min)
It could be slides. (<10 min)

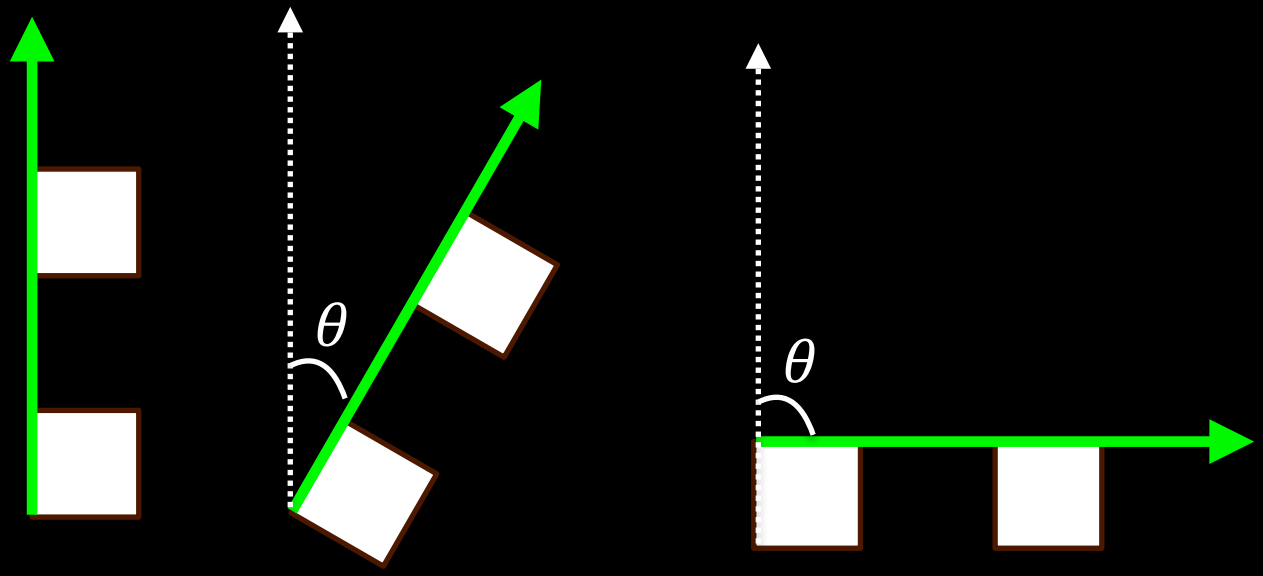
Don't flip around for files off-the-cuff.

Don't spend too time on fluff or excuses for limited progress.
"I expect to have more time next week now that midterms are over"
is better than
"Sorry I didn't make much progress; I was very busy with midterms."
The former is a confident planning statement, while the latter sounds like whining.

Take time to explain any *new* sketches or plots.
Take time to credit your colleagues.

Measuring zenith angle distribution of cosmic rays

Collected data varying angles to explore zenith angle rate dependence.

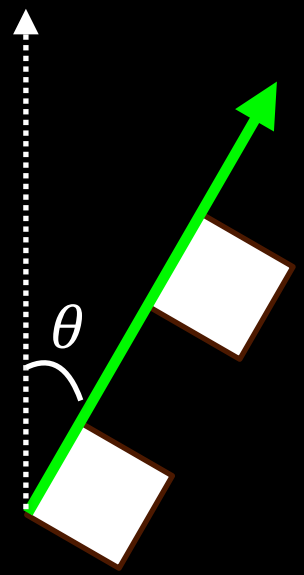


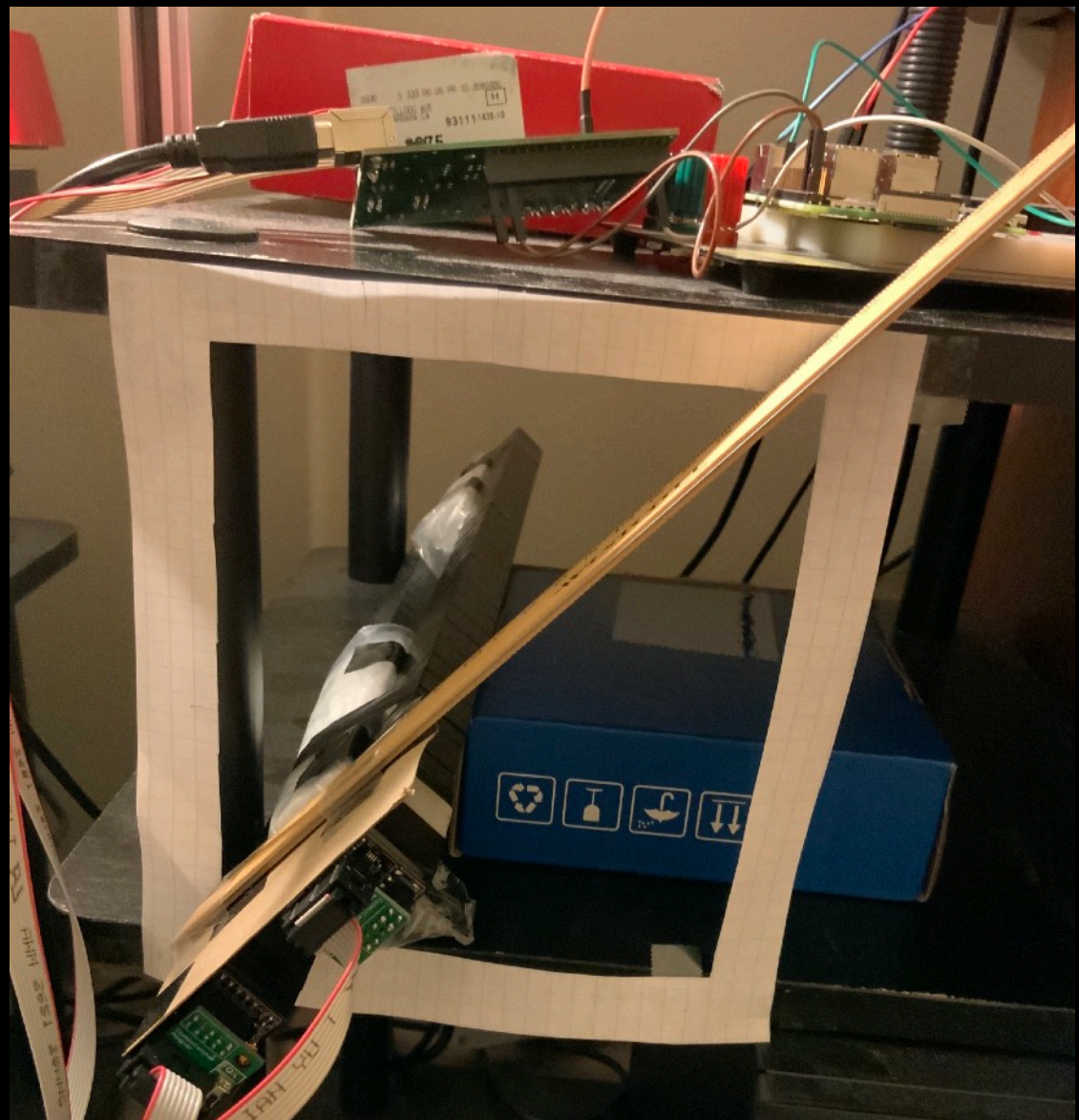
Runs collected over 4 days with changes made a random times after at least a few hours of data collected.

Rate precision is about ± 0.2 - 0.4 counts/minute.
Not dominant uncertainty in the end.

Measuring zenith angle distribution of cosmic rays

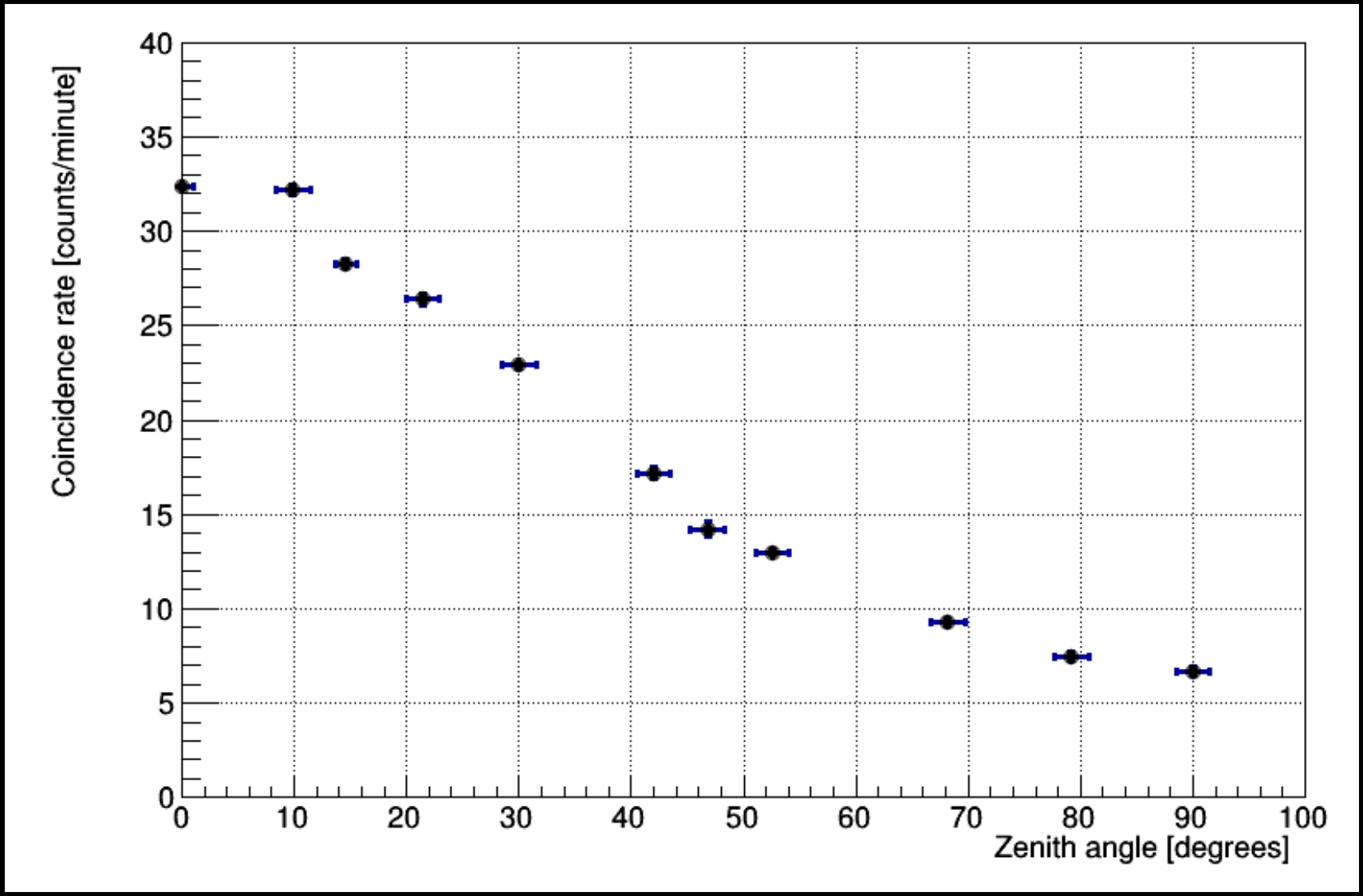
Measure angle with simple trigonometry.
Precise to about 1 or 2 degrees. Not critical uncertainty for conclusions.





Measured rate vs angle

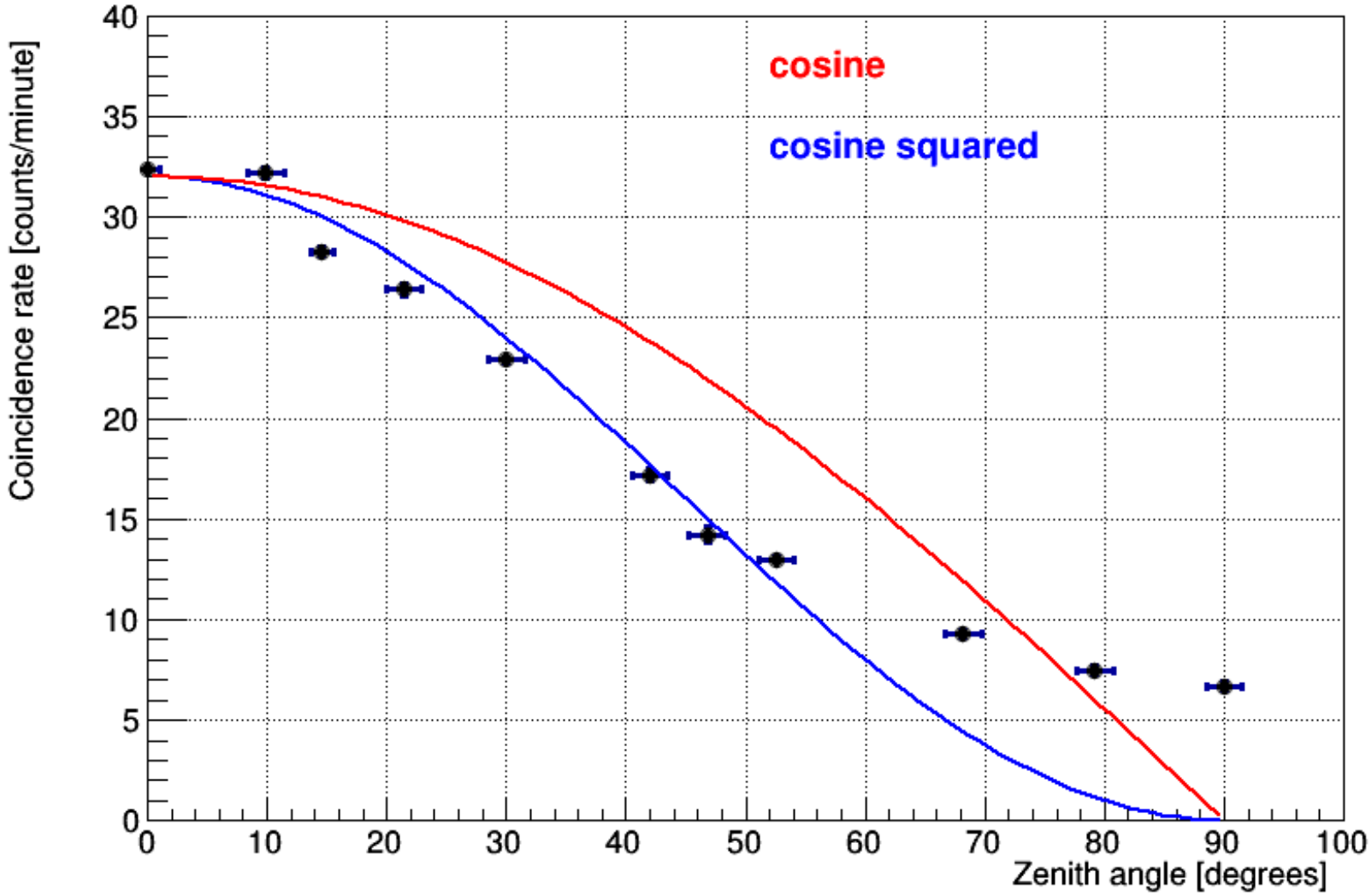
First angle scan shows reduction with angle.
Non-linear, at least at low and high angles.
Significant number of horizontal coincidences.



Measured rate vs angle

Reasonable to expect some cosine function due to variation in atmospheric absorption.

$\cos^2\theta$ is better than $\cos\theta$, but neither describes the low and high angles.



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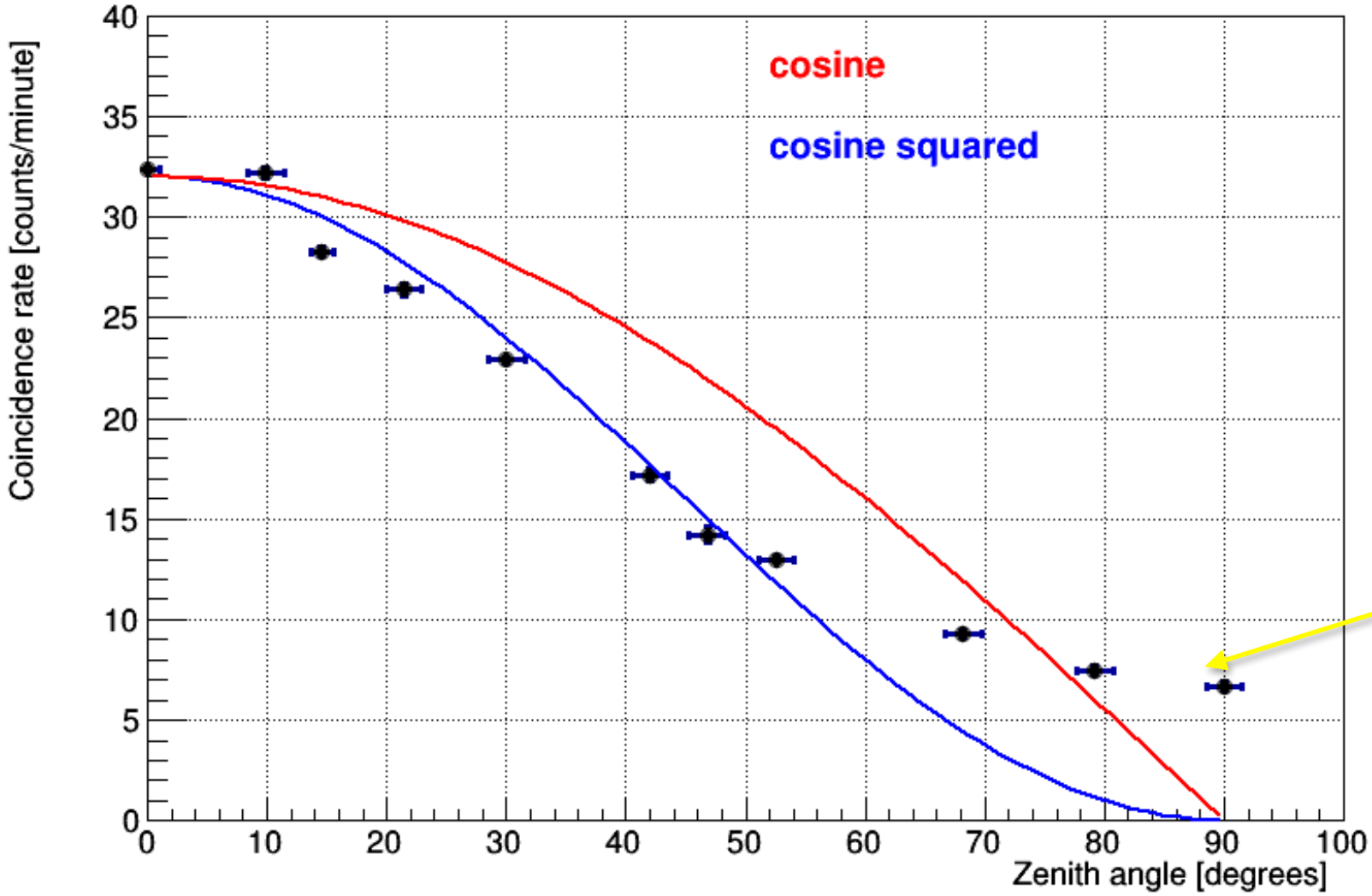
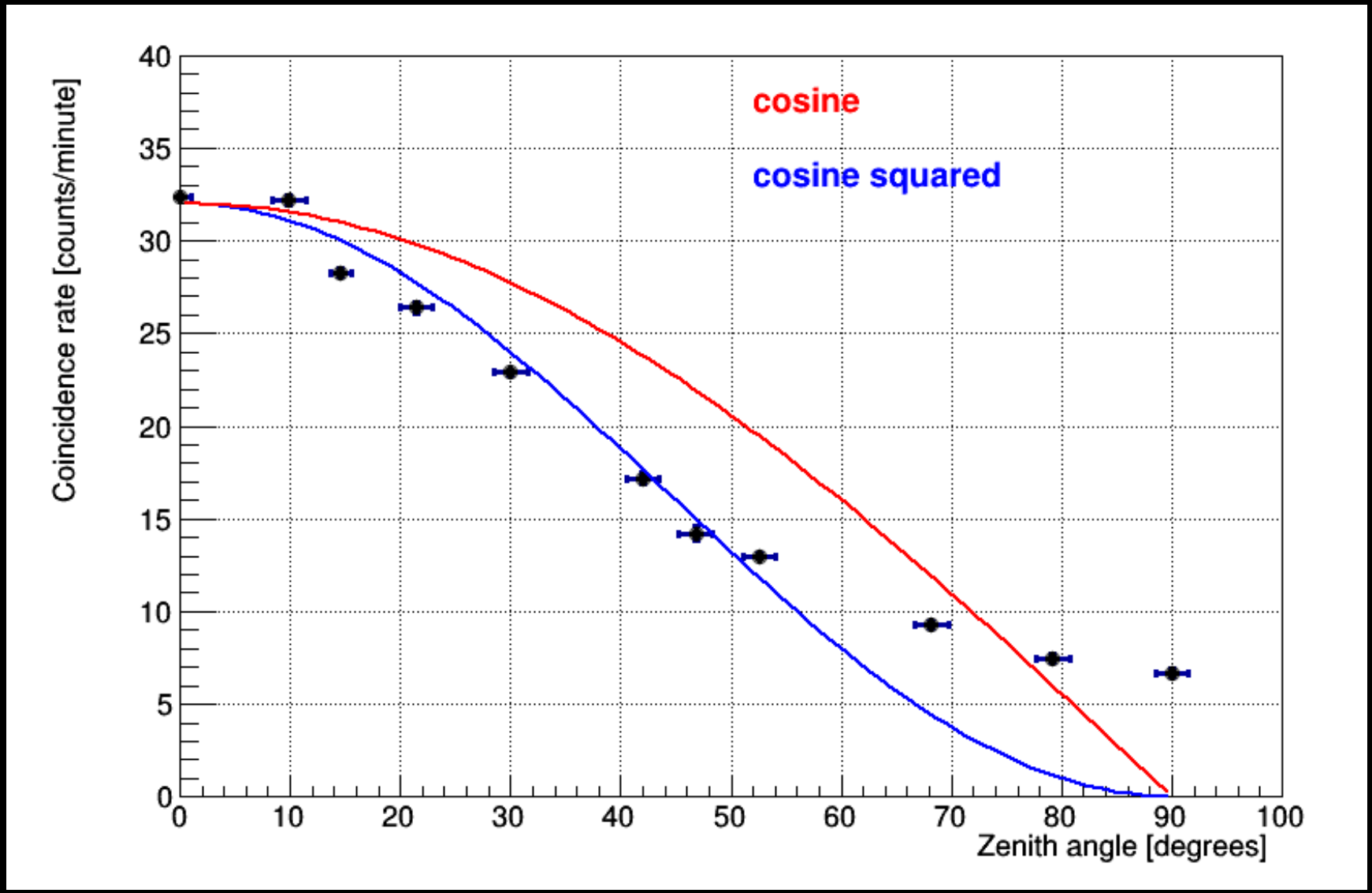


Excess near horizontal.
May be a different process.

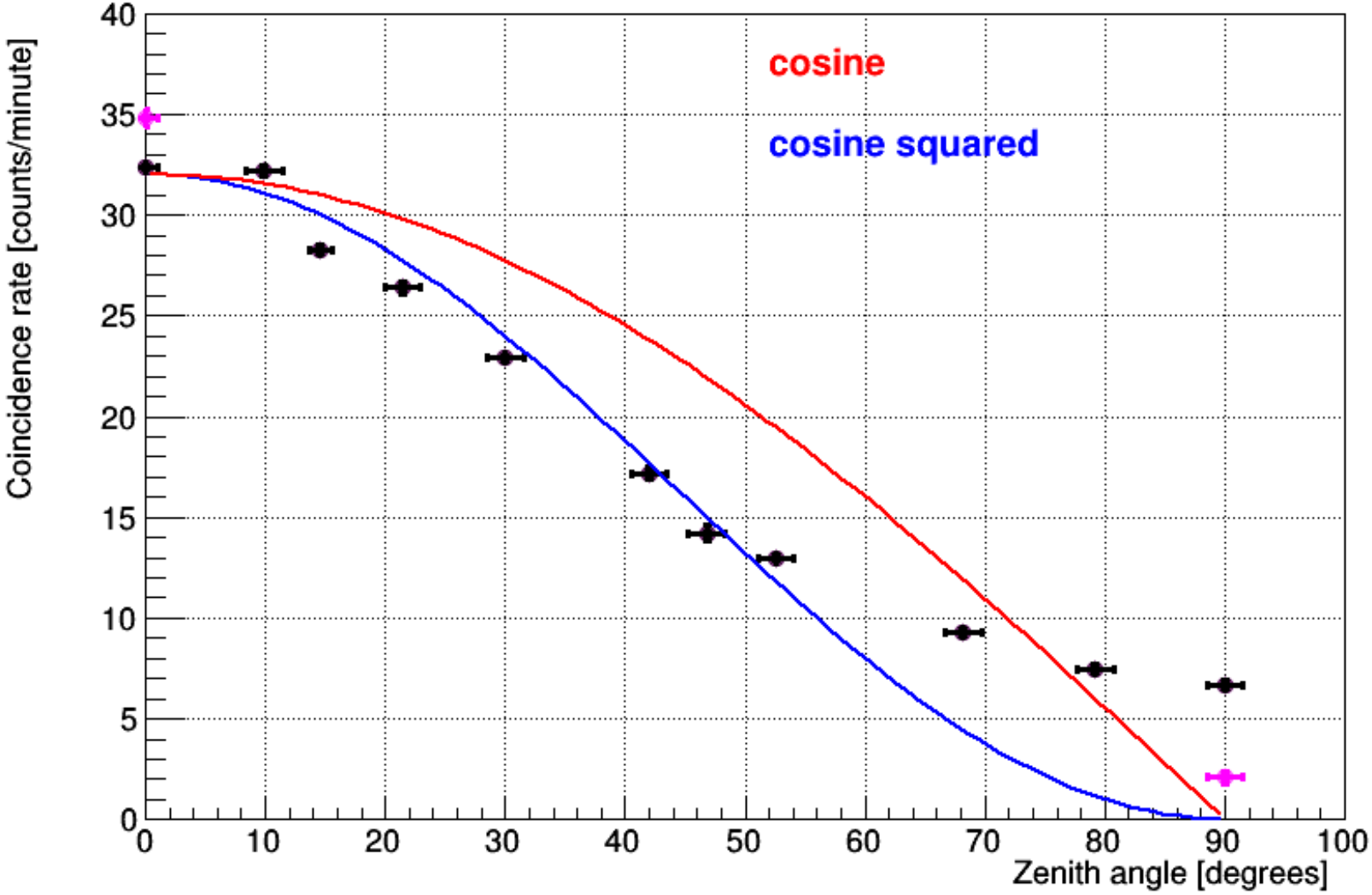
Follow up measurements

1). Repeat the first vertical measurement to check for consistency.
2). Check effect of wider separation in horizontal configuration.



Follow up measurements

1). Repeat the first vertical measurement to check for consistency.
2). Check effect of wider separation in horizontal configuration.
⇒Evidence of instability and wide-angle acceptance effects.



Conclusion and next steps

Conclusions:

- Angular distribution, falls strongly with θ.
- Excess near horizontal.

Next steps:

1). Repeat scan with wider bar separation.
Maybe measure the θ=90^{o} rate as a function of separation?

2). Improve angle measurement for speed, not precision.

3). Study effect of 3D vs 2D angle.
Probably best as numerical simulation vs analytical calculation.
May be easy to do by randomly generating parent distribution and then doing ray tracing.
Could have first test of this next week.

Elevator speech version

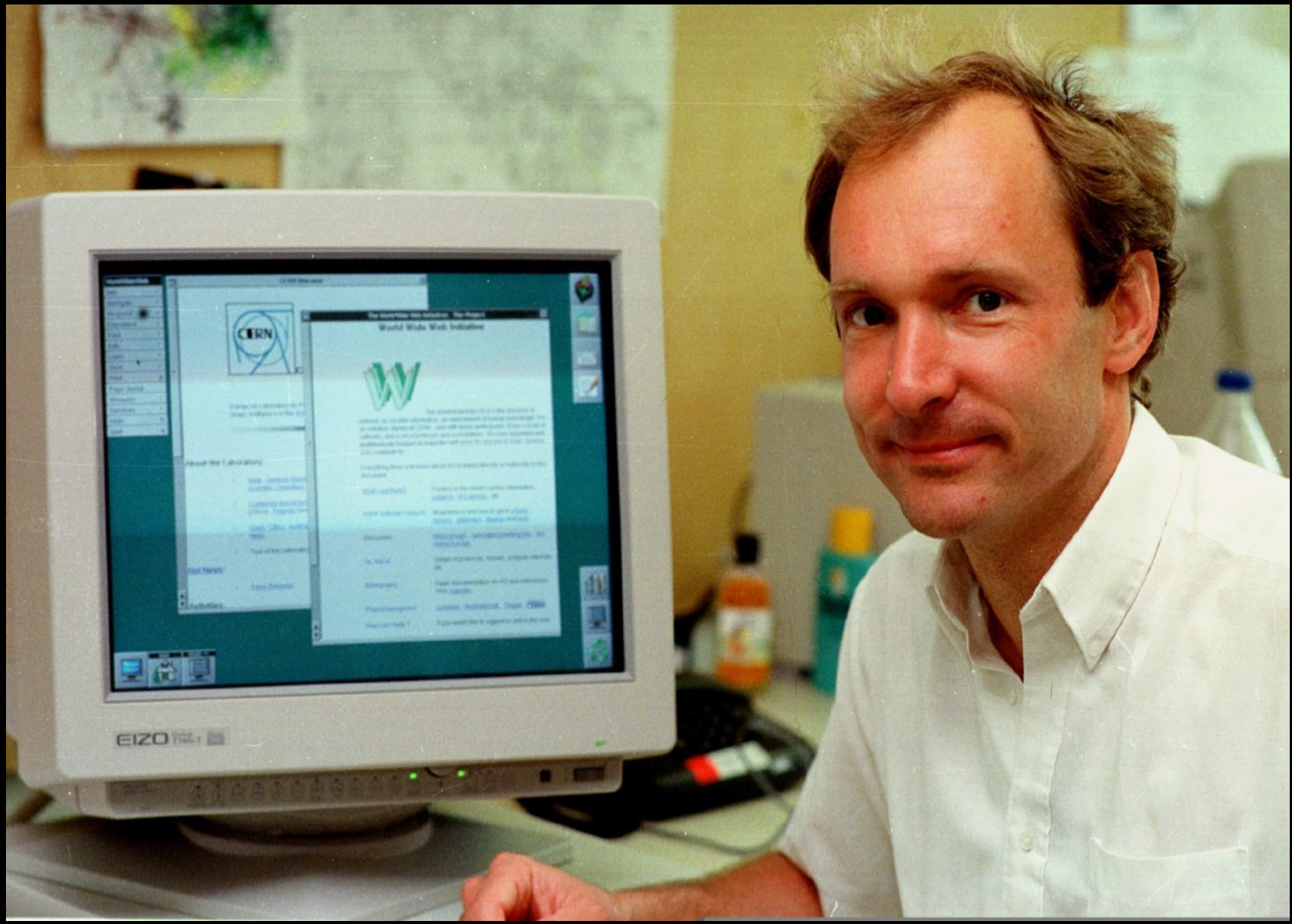
I've measured the coincidence rate as a function of angle with a pair of bars separated by about 3 cm. It varies from about 30 counts per minute for vertical orientation down to about 5 for horizontal orientation. The shape of the angle dependence is steeper than a cosine. It is closer to a cosine squared distribution, though that is not a good fit. In particular, there is an excess for angles near horizontal. However, I have taken a repeat measurements at one angle and find a result that is inconsistent with the initial measurement. I plan to repeat the angle scan using a larger separation between the bars, which will take a week. I am also considering using a numerical simulation to fold in the 2D nature of the bars from an assumed 3D zenith angle dependence.

Web scripting

A browser is an easy way to view info from any computer, including RPi
HTML is the language that your browser recognizes to display the info.
Web browser is easier than logging in and issuing unix commands to view info.
Would also like to use a web browser to control the data taking.

I will give you a quick tour of
HTML = hypertext markup language
and
CGI = common gateway interface

World-Wide Web invented in 90's at
CERN, the European Organization for Nuclear Research.

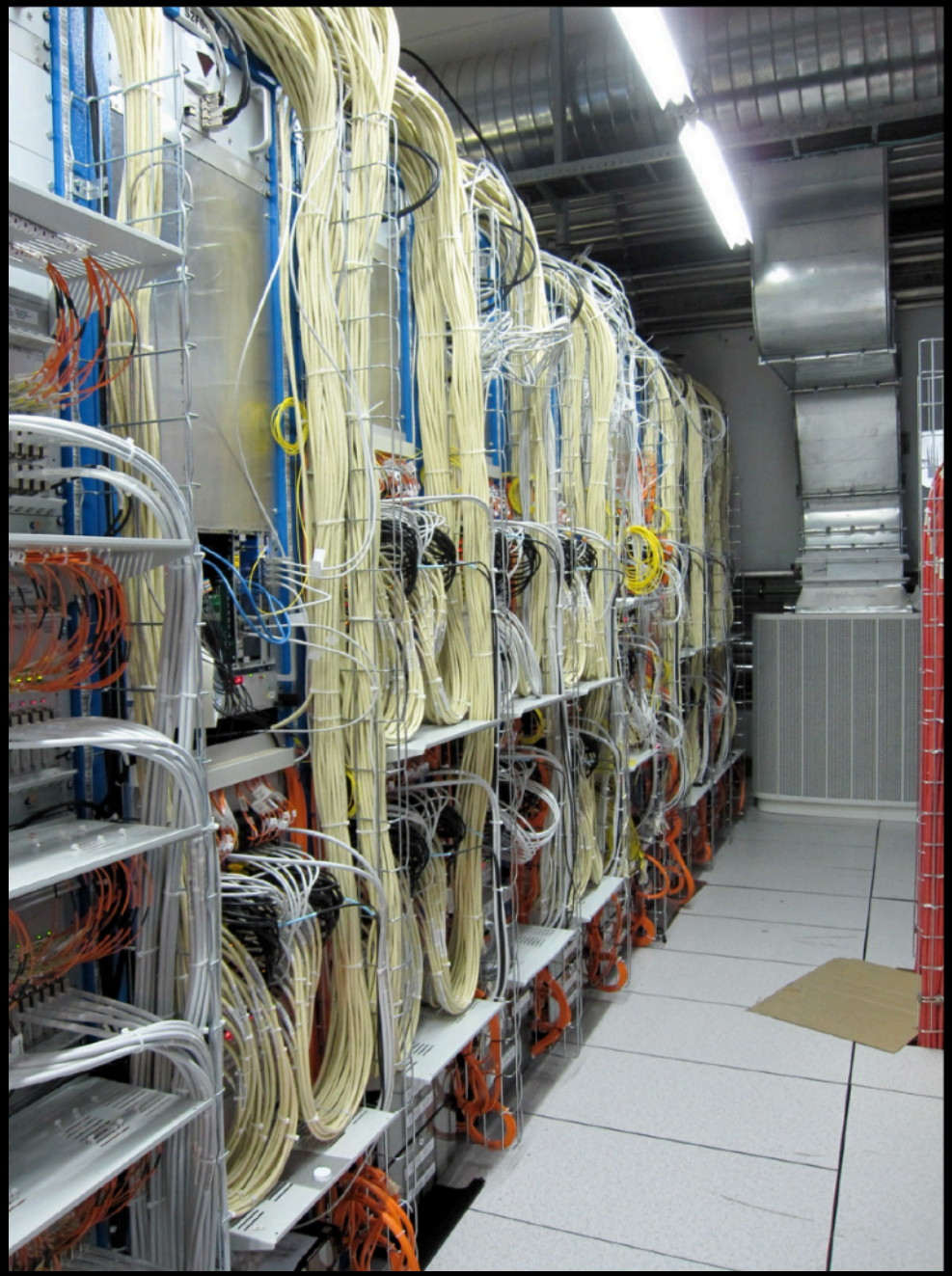


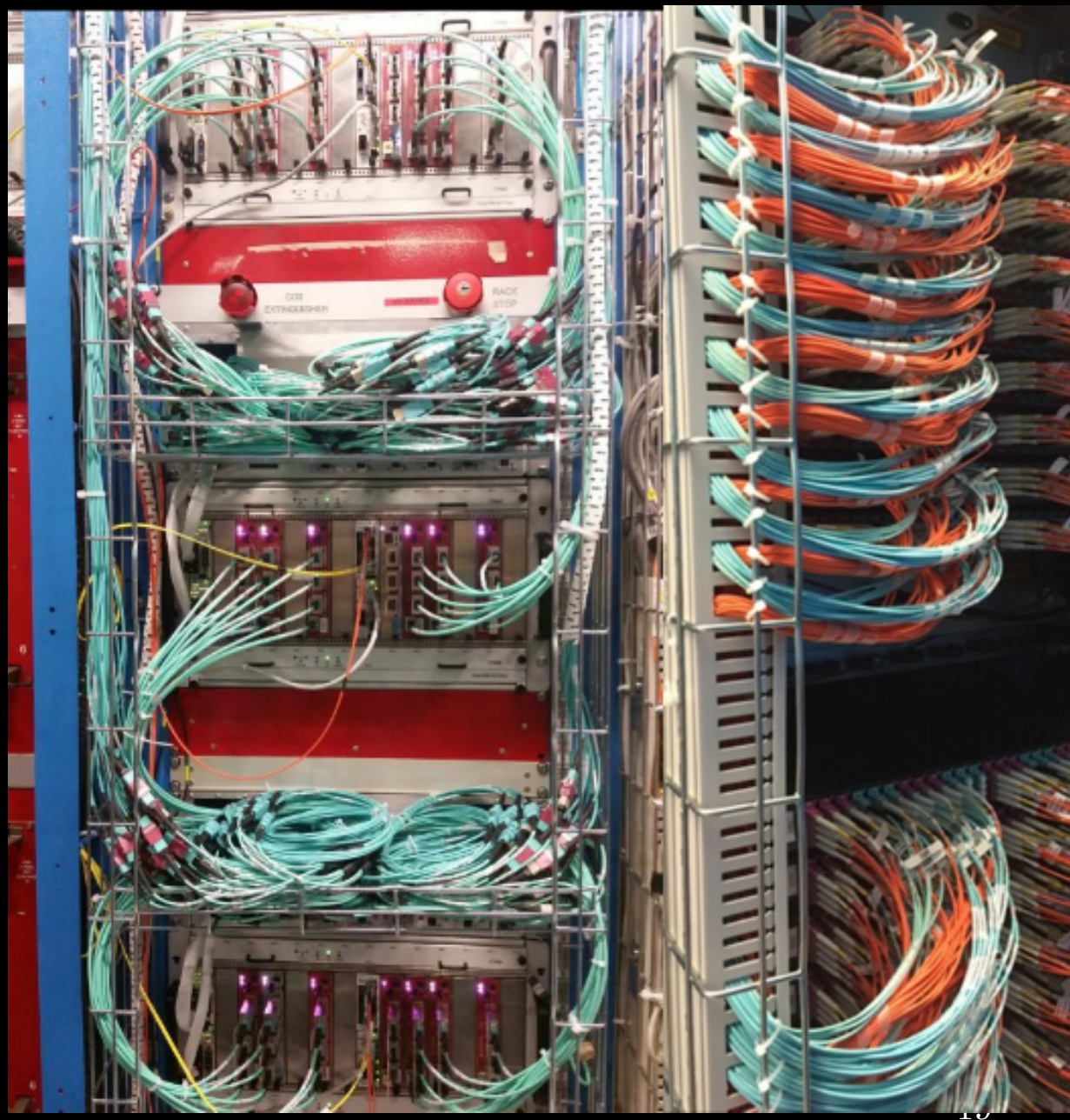
CERN, the European Organization for Nuclear Research.

CERN, the European Organization for Nuclear Research.
Birthplace of the World-Wide Web

The control room for a modern experiment at CERN
Uses the web for experiment control

This controls a large number of "computers" in a hierarchy of nodes down to ASICs connected to the detectors.





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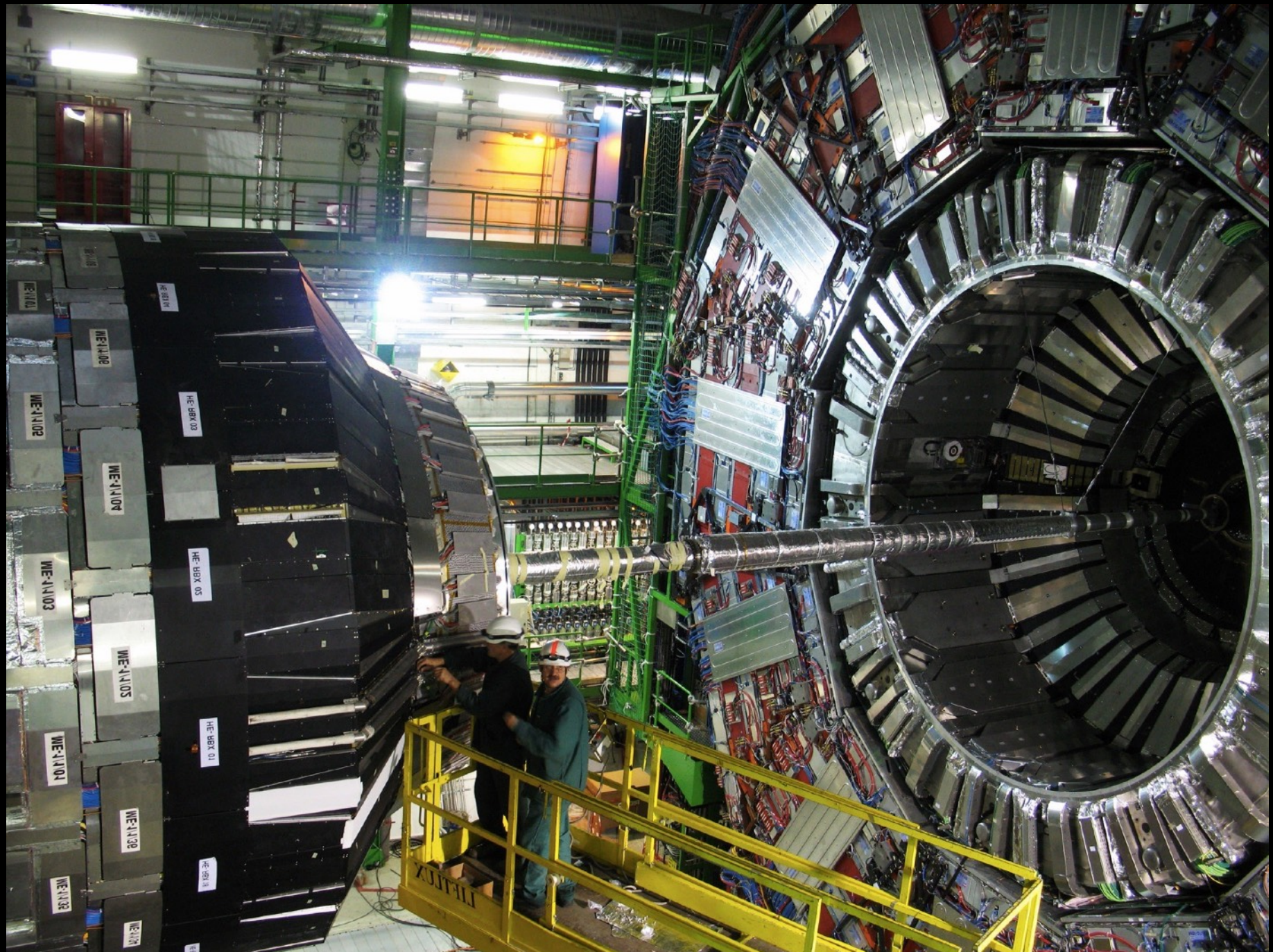

Let's do something similar for our RPi.

We have a limited set of commands, they can become buttons on a web page that we just click from anywhere to do what we need: monitor, command, and control.

A bit of HTML: markup with <TAG>, similar to LaTeX.

<TITLE>blah</TITLE>

<P>
Blah blah
</P>

<PRE>
Pre-formatted text
</PRE>

<B>bold text</B>
<I>italic text</I>

x² and y₁
Ω ± μ …

```
<OL>
 <LI>
 <LI>
…
</OL>

<UL>
 <LI>
 <LI>
…
</UL>

<IMG WIDTH=X% SRC="file">

<A HREF="some url">displayed text</A>
```

```
<TABLE BORDER=1>
 <TR>
 <TH>Column header 1</TH>
 <TH>Column header 2</TH>
…
</TR>

 <TR>
 <TD>Cell 1</TH>
 <TD>Cell 2</TH>
…
</TR>

</TABLE>
```

Easily google for syntax and special modifiers.

Look at ~/150/web/index.html as example
Look at ~/150/data/Run41/index.html as example

Can "View Source" in browser

Web scripting is just dynamically generating web "pages".

Our `CosmicRunStart` script dynamically generated a page.
Our `CosmicRunPlot` script dynamically generated plots for the page.

A "CGI script" is just a way to dynamically generate a "page"
when requested by a browser.

Web server executes as the "www-data" user.
/var/www/html
/usr/lib/cgi-bin

```
sudo a2enconf serve-cgi-bin
sudo a2enmod cgid

sudo emacs /etc/apache2/sites-enabled/000-default.conf

#Add this text

ScriptAlias /cgi-bin/ /usr/lib/cgi-bin/
<Directory "/usr/lib/cgi-bin">
    AllowOverride None
    Options +ExecCGI -MultiViews +SymLinksIfOwnerMatch
    Order allow,deny
    Allow from all
</Directory>


sudo systemctl restart apache2
```