

TOOLS FOR SCIENTIFIC COMPUTING 4

Holger Schulz (IPPP)
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March 18, 2016

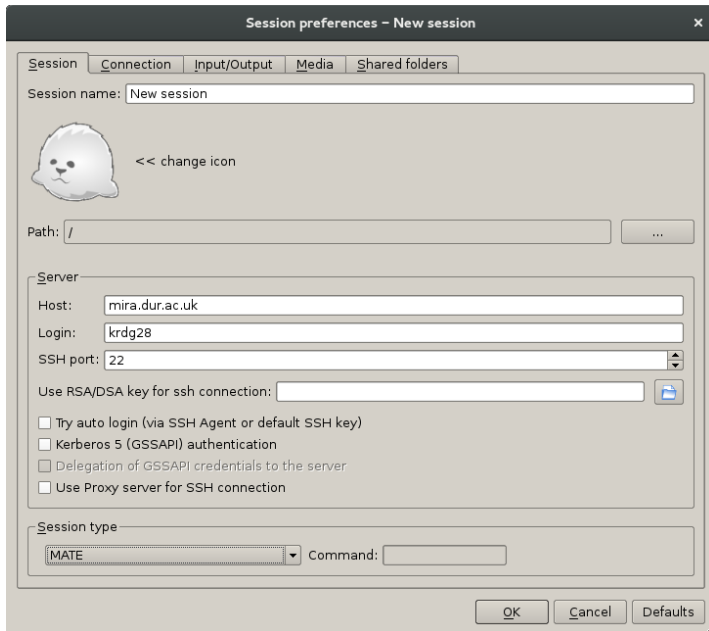


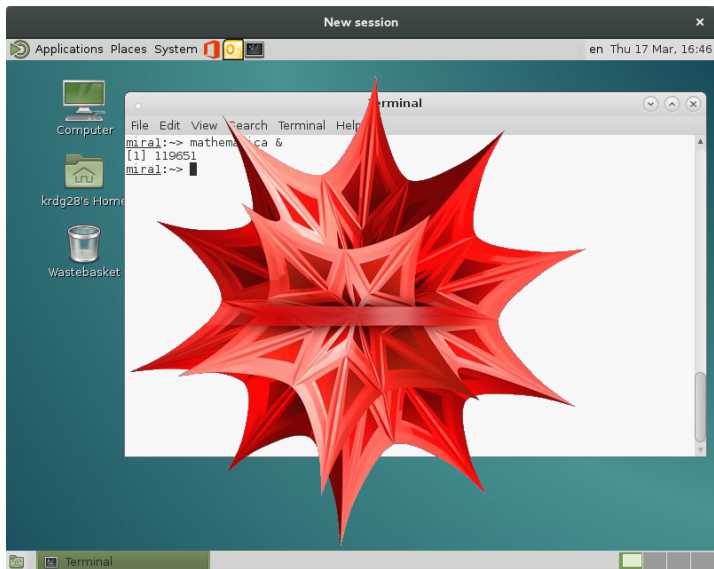
COURSE OVERVIEW

- 1 Introduction to `bash`
- 2 Introduction to `python` and `matplotlib`
- 3 Typesetting with \LaTeX
- 4 More on remote/group work

X2GO

- Free Remote Desktop application
 - Mainly for accessing Linux computers
 - Works from Linux, MacOS and Windows
-
- Linux example: `x2goclient` in terminal
 - Need to know Desktop environments available on target computer
 - Examples:
 - `mira.dur.ac.uk` runs with MATE
 - `login.phy.ip3.dur.ac.uk` runs with XFCE





SCREEN

- Super handy (linux) tool if you work remotely on terminals a lot
 - Essentially a remote terminal that does not die upon loss of SSH connection
 - Caveat: does not work with mira at the moment
-
- `https://asciinema.org/a/4xzx7eevvgwve5bihoorrrp73b`
 - To start a new screen session on remote machine do `screen`
 - To resume a screen session do `screen -r`
 - `Ctrl-a-c` creates a new sub shell
 - `Ctrl-a-a` switches between sub shells
 - `Ctrl-a-"` brings up the list of sub shells

PORT FORWARDING

- Typical problem:
 - You want to download a paper from home
 - The journal server does not recognise your IP and wants money
- Solution:
 - Re-route your browser traffic via ssh through a university machine
 - E.g. `ssh -D 9999 krdg28@mira.dur.ac.uk` and keep terminal open

PORT FORWARDING — FIREFOX

Activities Firefox Thu Mar 17, 20:39:22

Hadrization properties of b quarks compared to light quarks in $e^+e^- \rightarrow q\bar{q}$ from 183 to 200 GeV - Mozilla Firefox

Preferences x Hadrization proper... x what is my ip - Goog... x

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Abstract

- 1 Introduction
- 2 Analysis and results
- 3 Comparison with models and QCD pr...
- 4 Conclusions

Acknowledgements
References

Figures and tables

- Table 1
- Table 2
- Table 3

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Physics Letters B

Volume 479, Issues 1-3, 20 April 2000, Pages 118-128

Hadronization properties of b quarks compared to light quarks in $e^+e^- \rightarrow q\bar{q}$ from 183 to 200 GeV

DELPHI Collaboration

P. Abreu^a, W. Adam^a, T. Adye^a, P. Adzic^b, Z. Albrecht^c, T. Aldenweireld^d, G.D. Aleksseev^e, R. Alemany^g, T. Allmendinger^f, P.P. Allport^a, S. Almedei^a, U. Amaldi^h, N. Amarian^a, S. Amato^g, E.G. Anassortzisⁱ, P. Andersson^a, A. Andreazza^j, S. Andringa^k, P. Antilogus^l, W.D. Apeñ^m, Y. Amoufⁿ, B. Asman^o, J.-E. Augustin^p, A. Augustinus^q, P. Bailoi^r, A. Balestrero^s, P. Bambade^t, F. Barad^u, F. Cossutti^v, M. Costa^w, H.B. Crawley^x, D. Crennel^y, S. Crepe^z, G. Crosetti^{aa}, J. Cuevas Maestro^{ab}, S. Czella^{ac}, M. Daenonport^{ad}, W. Da Silva^{ae}, G. Della Ricca^{af}, P. Delgianni^{ag}, N. Demani^{ah}, D. De Angelis^{ai}, W. De Boer^{aj}, C. De Clercq^{ak}, B. De Lotto^{al}, A. De Min^{am}, L. De Paula^{an}, H. Dijkstra^{ao}, L. Di Ciaccio^{ap}, J. Dolbeau^{aq}, K. Doroba^{ar}, M. Dracop^{as}, J. Dress^{at}, M. Dns^{au}, A. Duperrin^{av}, J.-D. Durand^{aw}, G. Eigen^{ax}, T. Ekalo^{ay}, G. Ekspang^{az}, M. Elett^{ba}, M. Elsing^{bb}, J.-P. Enge^{bc}, M. Espres^{bd}, G. Fanourakis^{be}, D. Fassouliotis^{bf}, J. Fayet^{bg}, M. Feindt^{bh}, A. Ferre^{bi}, E. Ferner-Ribas^{bj}, F. Ferri^{bk}, S. Fichtel^{bl}, A. Fiestone^{bm}, U. Flaggmeyer^{bn}, H. Foeth^{bo}, E. Fokitis^{bp}, F. Fontanelli^{bq}, B. Franek^{br}, A.G. Frodeser^{bs}, R. Fruhwirth^{bt}, F. Fulda-Quenzer^{bu}, J. Fuster^{bv}, A. Galloni^{bw}, D. Gamba^{bx}, S. Gambino^{by}, M. Gandelman^{bz}, C. Garcia^{ca}, C. Gaspar^{cb}, M. Gaspar^{cc}, U. Gasparini^{cd}, Ph. Gauzzi^{ce}, E.N. Gazis^{cf}, D. Gelé^{cg}, T. Geralis^{ch}, N. Ghobane^{ci}, I. Gil^{cj}, F. Glag^{ck}, R. Gokiel^{cl}, B. Golot^{cm}, G. Gomez-Caballero^{cn}, P. Goncalves^{co}, I. Gonzalez Caballero^{cp}, G. Gopa^{cq}, L. Gom^{cr}, Yu. Gouz^{cs}, V. Gracco^{ct}, J. Grab^{cu}, E. Graziani^{cv}, P. Orts^{cw}, G. Grosdidier^{cx}, K. Grzelak^{cy}, J. Guy^{cz}, C. Haagi^{ca}, F. Hahn^{cb}, S. Hahn^{cc}, S. Haidar^{cd}, A. Haldre^{ce}, K. Hamacher^{cf}, J. Hansen^{cg}, F.J. Harris^{ch}, F. Haule^{ci}, V. Hedberg^{cj}, S. Heising^{ck}, J.J. Hernandez^{cl}, P. Herquet^{cm}, H. Heri^{cn}, T.L. Hessing^{co}, J.-M. Heuse^{cp}, E. Higoni^{cq}, S.-O. Holmgren^{cr}, P.J. Holt^{cs}, S. Hoorebeke^{ct}, M. Houlden^{cu}, J. Hrubec^{cv}, M. Huber^{cw}, K. Hué^{cx}, G.J. Hughes^{cy}, K. Hultqvist^{cz}, J.N. Jackson^{ca}, R. Jacobsson^{cb}, P. Jaloche^{cc}, R. Janik^{cd}, Ch. Jantskog^{ce}, J. Jantskog^{cf}, P. Jany^{cg}, B. Jean-Marie^{ch}, D. Jeans^{ci}, E.K. Johansson^{cj}, P. Jonsson^{ck}, C. Joram^{cl}, P. Julliot^{cm}, L. Jungermann^{cn}, F. Kapusta^{co}, K. Karafasoulis^{cp}, S. Katsanevas^{cq}, E.C. Katsoulis^{cr}, R. Keranen^{cs}, G. Kieme^{ct}, B.P. Kersevan^{cu}, Yu. Khokhlov^{cv}, B.A. Khomenko^{cw}, N.N. Khovansk^{cx}, A. Kiskinene^{cy}, B. King^{cz}, A. Kivrig^{ca}, N.J. Kjaer^{cb}, O. Klapp^{cc}, H. Klein^{cd}, P. Klue^{ce}, P. Kokkinias^{cf}, V. Kostoukhina^{cg}, C. Kourkoumelis^{ch}, O. Kouznetsov^{ci}, M. Kramer^{cj}, E. Krizic^{ck}, Z. Krumstein^{cl}, P. Kubicek^{cm}, J. Kurovski^{cn}, K. Kurimien^{co}, J.W. Lamsa^{cp}, D.W. Lane^{cq}, V. Lapin^{cr}, J.-P. Laugier^{cs}, R. Lauhakangas^{ct}, G. Leder^{cu}, F. Ledroit^{cv}, V. Lefebvre^{cw}, L. Leimonen^{cx}, A. Lessos^{cy}, R. Leitner^{cz}, G. Lenzen^{ca}, V. Lepelletier^{cb}, T. Lesiak^{cc}, M. Lethuillier^{cd}, J. Libby^{ce}, W. Liebig^{cf}, D. Liko^{cg}, A. Lipniacki^{ch}, I. Lippin^{ci}, B. Loenstaed^{cj}, J.G. Loken^{ck}, J.H. Lopez^{cl}, J.M. Lopez^{cm}, R. Lopez-Fernandez^{cn}, D. Loukas^{co}, P. Lutz^{cp}, L. Lyons^{cq}, J. MacNaughton^{cr}, J.R. Mahon^{cs}, A. Maior^{ct}, A. Malesk^{cu}, T.G.M. Malmgren^{cv}, S. Maltezos^{cw}, V. Malyshev^{cx}, P. Mand^{cy}, J. Marco^{cz}, R. Marco^{ca}, B. Marcha^{cb}, M. Maroni^{cc}, J.C. Marif^{cd}, C. Mariotti^{ce}, A. Markou^{cf}, C. Martinez-Rivero^{cg}, S. Marti Garcia^{ch}, J.

Recommended articles

- Search for charmonium in e^+e^- interactions at $\sqrt{s}=189 \dots$ 2000, Physics Letters B
- Determination of $|V_{cb}|/|V_{cs}|$ with DELPHI at LEP 2000, Physics Letters B
- Determination of the $e^+e^- \rightarrow \gamma\gamma(\gamma)$ cross-section at c... 2000, Physics Letters B

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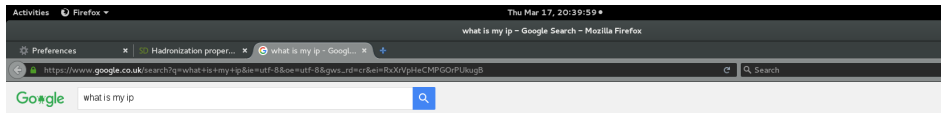
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HepData Reaction data

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PORT FORWARDING — FIREFOX



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92.23.125.114

Your public IP address

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<https://www.whatsmyip.com/>

Lookup, Trace, Locate, Change, Hide ANY IP Address.

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What is My IP Address? IP Address Tools and More

whatsmyipaddress.com/

IP address lookup, location, proxy detection, email tracing, IP hiding tips, blacklist check, speed test, and forums. Find, get, and show **my IP** address.

IP Lookup – How to Hide Your IP Address – Update your IP location – None Detected

What is my IP address? - IP Location Finder - Geolocation

<https://www.iplocation.net/find-ip-address>

This is the public IP address of your computer. If your computer is behind a router or used a proxy server to view this page, the IP address shown is your router or proxy server. ... An example of IPv4 address is 216.3.128.12, which is the IP address previously assigned to geolocation ...

Find IP addresses of a private ... Find IP address of a network ... Contact Us

What's My IP Address? Networking Tools & More

www.whatsmyip.org/

IP lookup and many other networking tools: port scanners, traceroute, ping and HTTP headers. Also text related tools like HTML characters.

What is My IP Lookup Tool - Check Public IP Address ...

mec@box.com/WhatIsMyIP/

ABOUT WHATISMYIP LOOKUP: Ok, so this page shows you your public IP Address. But the MxToolBox WhatIsMyIP also runs a blacklist check on over 100 lists ...

PORT FORWARDING — FIREFOX

The screenshot shows the Firefox Preferences window, specifically the Advanced > Network tab. The 'Connection' section is active, showing options for proxy settings. A 'Connection Settings' dialog box is open, allowing for manual proxy configuration. The dialog has the following fields and options:

- Configure Proxies to Access the Internet**
 - No proxy
 - Auto-detect proxy settings for this network
 - Use system proxy settings
 - Manual proxy configuration:
 - HTTP Proxy: [] Port: 0
 - Use this proxy server for all protocols
 - SSL Proxy: [] Port: 0
 - FTP Proxy: [] Port: 0
 - SOCKS Host: localhost Port: 9999
 - SOCKS v4
 - SOCKS v5
 - Remote DNS
- No Proxy for:
 - localhost, 127.0.0.1
 - Example: mozilla.org, net.nz, 192.168.1.0/24
- Automatic proxy configuration URL: [] [Reload]
- Do not prompt for authentication if password is saved

Buttons: Help, Cancel, OK

PORT FORWARDING — FIREFOX

The screenshot shows the Firefox Preferences window, specifically the Advanced > Network tab. The 'Connection' section is active, showing options for proxy configuration. A 'Connection Settings' dialog box is open, allowing manual proxy configuration. The 'Manual proxy configuration' section is selected, and the 'No Proxy for:' list contains 'localhost, 127.0.0.1'. The 'SOCKS v4' option is selected under 'SOCKS Host: localhost'.

Activities Firefox Thu Mar 17, 20:39:05
Preferences - Mozilla Firefox

Preferences x Hadronization proper... x what is my ip - Google... x +

Firefox about:preferences#advanced Search

General Search Content Applications Privacy Security Sync Advanced

Advanced

General Data Choices **Network** Update

Connection

Configure how Firefox connects to the Internet

Cached Web Content

Your web content cache is currently using 168 MB of disc space

Override automatic cache management

Limit cache to MB of space

Offline Web Content and User Data

Your application cache is currently using 0 bytes of disc space

Tell me when a web site asks to store data for offline use

The following web sites are allowed to store data for offline use:

Connection Settings

Configure Proxies to Access the Internet

No proxy

Auto-detect proxy settings for this network

Use system proxy settings

Manual proxy configuration:

HTTP Proxy: Port:

Use this proxy server for all protocols

SSL Proxy: Port:

FTP Proxy: Port:

SOCKS Host: localhost Port:

SOCKS v4 SOCKS v5 Remote DNS

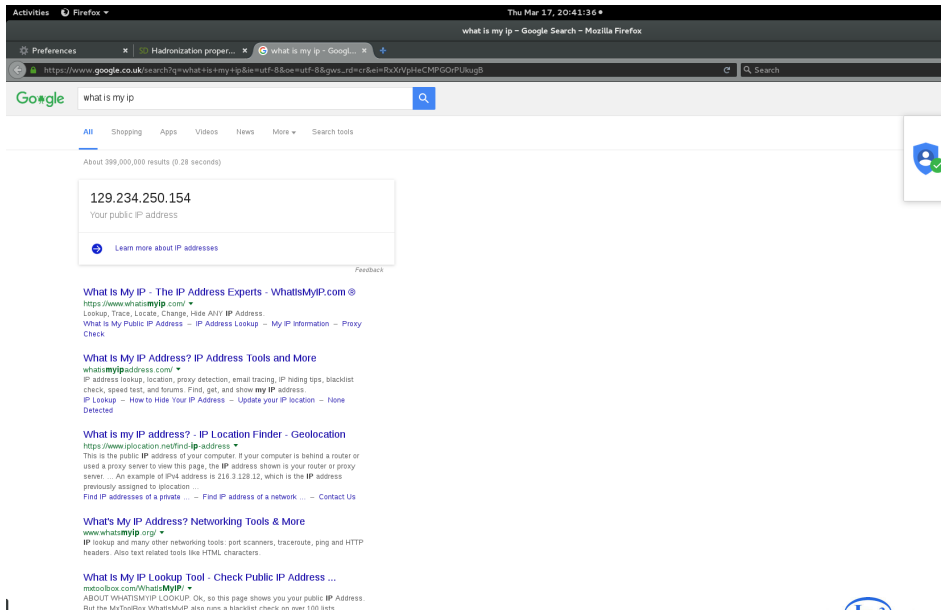
No Proxy for:

Example: .mozilla.org, .net.nz, 192.168.1.0/24

Automatic proxy configuration URL:

Do not prompt for authentication if password is saved

PORT FORWARDING — FIREFOX



Activities Firefox Thu Mar 17, 20:41:36 • what is my ip - Google Search - Mozilla Firefox

Preferences x Hadronization proper... x what is my ip - Google... x

https://www.google.co.uk/search?q=what+is+my+ip&ie=utf-8&oe=utf-8&gws_rd=cr&ei=RxXrVpHeCMPGOrPUkugB Search

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All Shopping Apps Videos News More Search tools

About 399,000,000 results (0.28 seconds)

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whatsmyipaddress.com/
IP address lookup, location, proxy detection, email tracing, IP hiding tips, blacklist check, speed test, and forums. Find, get, and show **my IP** address.
IP Lookup - How to Hide Your IP Address - Update your IP location - None Detected

What is my IP address? - IP Location Finder - Geolocation
<https://www.iplocation.net/find-ip-address>
This is the public IP address of your computer. If your computer is behind a router or used a proxy server to view this page, the IP address shown is your router or proxy server. ... An example of IPv4 address is 216.3.128.12, which is the IP address previously assigned to iplocation ...
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What's My IP Address? Networking Tools & More
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IP lookup and many other networking tools: port scanners, traceroute, ping and HTTP headers. Also text related tools like HTML characters.

What is My IP Lookup Tool - Check Public IP Address ...
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ABOUT WHATISMYIP.LOOKIEUP: Ok, so this page shows you your public IP Address. But the MxToolBox WhatsMyIP also runs a blacklist check on over 100 lists ...

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Physics Letters B
Volume 479, Issues 1-3, 20 April 2000, Pages 118-128

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DELPHI Collaboration

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Recommended articles

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- Determination of $|V_{ub}|/|V_{cb}|$ with DELPHI at LEP 2000, Physics Letters B
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Abstract

The DELPHI detector at LEP has collected 54 pb^{-1} of data at a centre-of-mass energy around 183 GeV during 1997, 158 pb^{-1} around 189 GeV during 1998, and 187 pb^{-1} between 192 and 200 GeV during 1999. These data were used to measure the average charged particle multiplicity in $e^+e^- \rightarrow b\bar{b}$ events, $\langle n \rangle_{b\bar{b}}$, and the difference $\delta_{b\bar{b}}$ between $\langle n \rangle_{b\bar{b}}$ and the multiplicity, $\langle n \rangle_{q\bar{q}}$, in generic light quark (u,d,s) events:

$$\delta_{b\bar{b}}(183 \text{ GeV}) = 4.55 \pm 1.31(\text{stat}) \pm 0.73(\text{syst}),$$
$$\delta_{b\bar{b}}(189 \text{ GeV}) = 4.43 \pm 0.85(\text{stat}) \pm 0.61(\text{syst}),$$
$$\delta_{b\bar{b}}(200 \text{ GeV}) = 3.39 \pm 0.89(\text{stat}) \pm 1.01(\text{syst}).$$

This result is consistent with QCD predictions, while it is inconsistent with calculations assuming that the multiplicity accompanying the decay of a heavy quark is independent of

H. Schulz

Tools for scientific computing 3

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IP3

SAVING YOUR WORK

- General hint: make backups of thesis and code
- Ideally online, i.e. backup decoupled from your local machine
- Versioning software (subversion, git, mercurial)
- Cloud storage

VERSIONING SOFTWARE

- 'Central' location of your files (remote machine)
- make changes locally, commit changes to remote
- Multi-user, multi-machine support

<https://asciinema.org/a/deinokpbkjxyvqjdj1v51icew>

- SVN: committed change in file stored as copy of file
- git: (and mercurial) keeps track of differences between two version of a file
 - more light weight
 - more flexible
 - No need for central server to go through history
- `github.com` free and easy to use (group work)

DROPBOX

- Cross-platform cloud storage
- Integrates with your file-system (`$HOME/Dropbox`)
- Limited to 2GB, can be increased slightly, limited versioning
- Quite popular in science (easy to use)

WORK ORGANISATION WITH TRELLO

The screenshot shows a Trello board named "Professor" with several columns representing different stages or tasks. The columns are:

- Version 2.2**:
 - Validate tune weight usage
 - Use `pos_match` to exclude some bins from path-matched histograms in `prof-pol`
- Version 2.2.1**:
 - Use the `prof2.ch2` functions in `prof-tune` etc.
 - Provide easy plotting functions for scalars, contours, and 2D in `prof2` plotting package
 - Strip `tmpl` from `prof-samples` template input names
 - Add `xy` labels to `Histo`
 - `prof1` legacy I/O compatibility
 - Load `pullHists` with an `asdict=False` optional arg. cf. `YODA`
 - Numerical stability again: I'm again getting SVD fitting problems at 5th order with `TopFilter` inputs. Ugh. Let's fix this properly.
- Version 2.3.3**:
 - Correlation handling in `GoF` calculation
 - Implement eigentunes
 - Allow user "plugin" override of `GoF` definition
 - Extra minimizer control: Use `posdef`? Use explicit polynomial gradient?
 - Remove uncatchable calls to `exit()` and `IO streams`. Prefer to throw exceptions / return strings directly, and when a print function is needed, give it an optional arg to specify the target stream.
 - Correlation calculation
 - Sensitivity calculation
- Far future, probably never happen**:
 - Web version of `prof1`: already underway: can we bundle `pull Flask`?
 - Need to abstract data types a bit more for 2D histograms, unbinned histograms, profiles, etc?
 - Allow no-Python builds
 - Bootstrap script for numpy, scipy, matplotlib, YODA, ...
 - Write a `env.sh` script on install
 - Implement asymm error interpolation
 - Allow error parameterisation on relative rather than absolute uncertainties
 - Allow logging (or general Python expression?) sampling without needing `Sympy`
 - Option for likelihood rather than `chi2` in `Fit` err (not necessarily pre-ruled, but should be easy in a custom tuning)
- Incoming**:
 - Multiweight treatment

On the right side, there is a "Menu" panel with options like "Add Members...", "Change Background", "Filter Cards", "Power-Ups", "Stickers", "More", "Activity", and a list of recent activity items.

IMAGE MANIPULATION WITH LINUX

- Gimp for general image manipulation (photoshop like)
- Inkscape for vector graphics

