FiTQun Minimisation Toy Model for 1D and 2D Fits

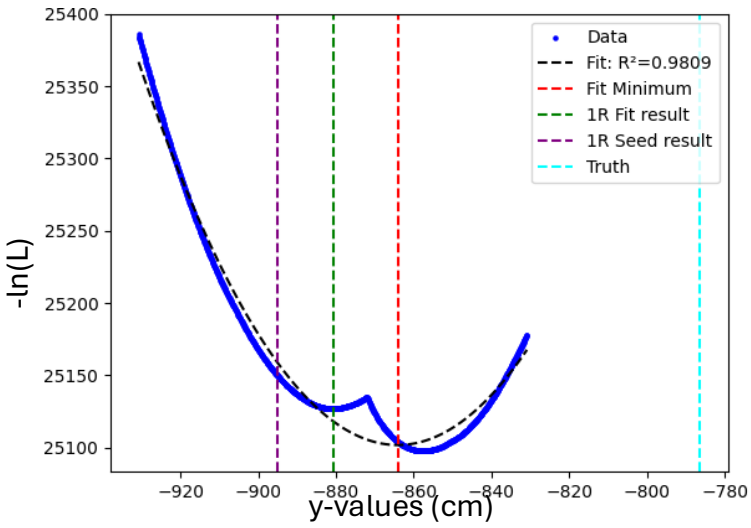
Julian Haas – LPNHE Reconstruction Meeting – 07.05.2025

SORBONNE UNIVERSITÉ

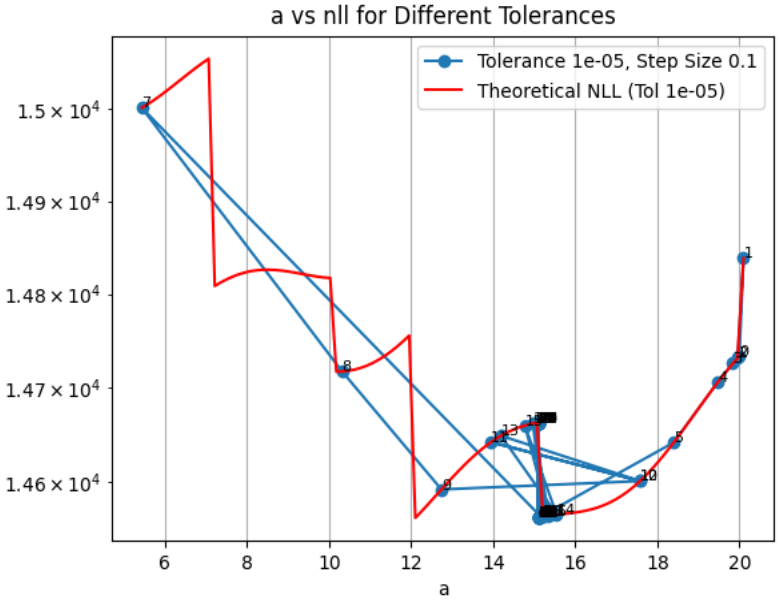
LPNHE PARIS

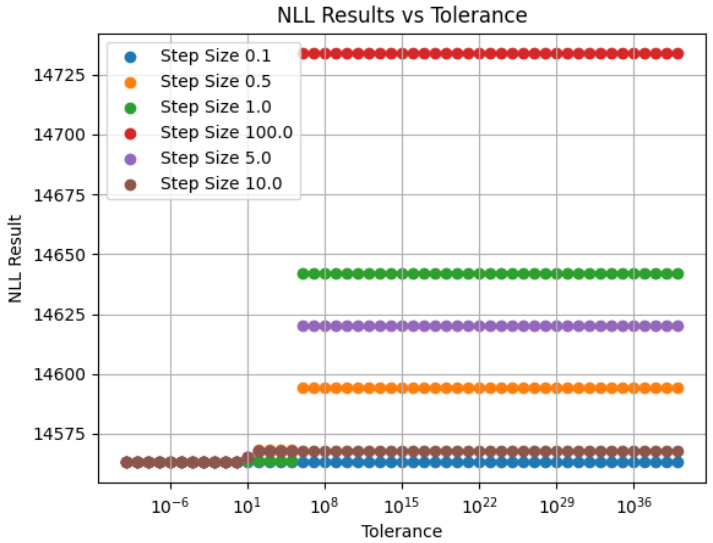
Balancing Precision and Efficiency

- fiTQun stuggles with discontinuities in the NLL profiles.
- It often converges to a minimum of the NLL curve, but sometimes not the global minimum
- The two parameters to influence the nature of the SIMPLEX/MIGRAD fit are the **tolerance** and the **initial step size** (and the seed)
- Create a toy model to study their influence in 1D and 2D fits, for artificially discontinuous curves



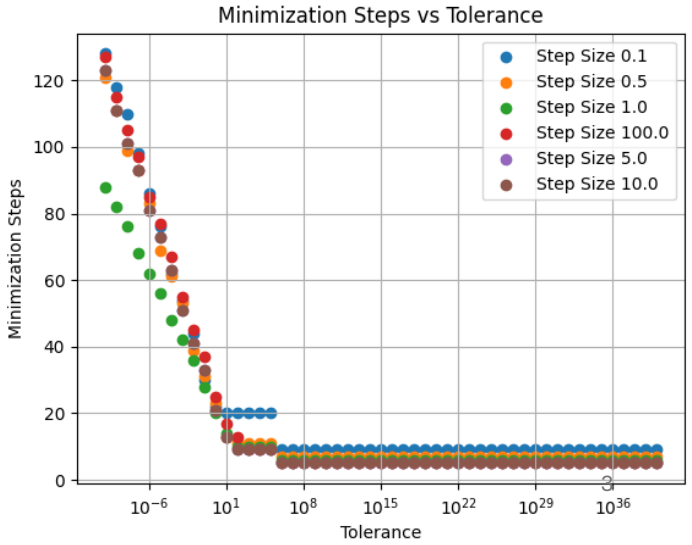
1D Fit Example (SIMPLEX)





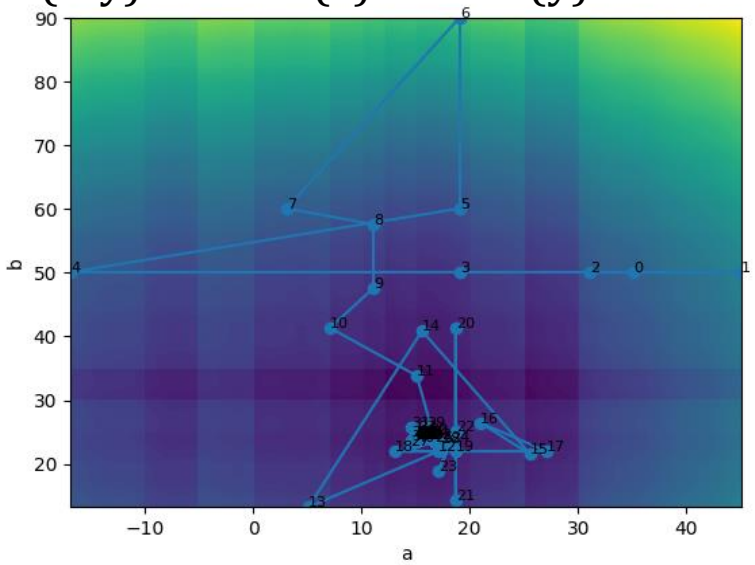
"NLL" = $(a-x)^2$ + b*sin(a) + c + discontinuities

- Discontinuities are positive or negative jumps
- Fit the function using a range of tolerances and step sizes
- Compare with fit result (final NLL value) and number of minimisation steps

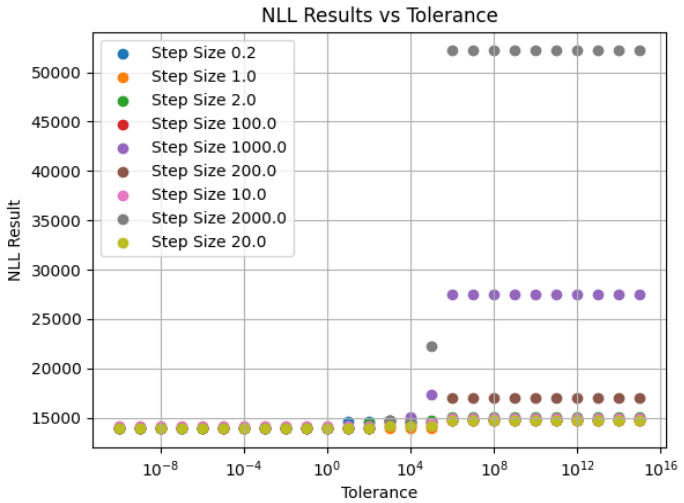


2D Fit Example (SIMPLEX)

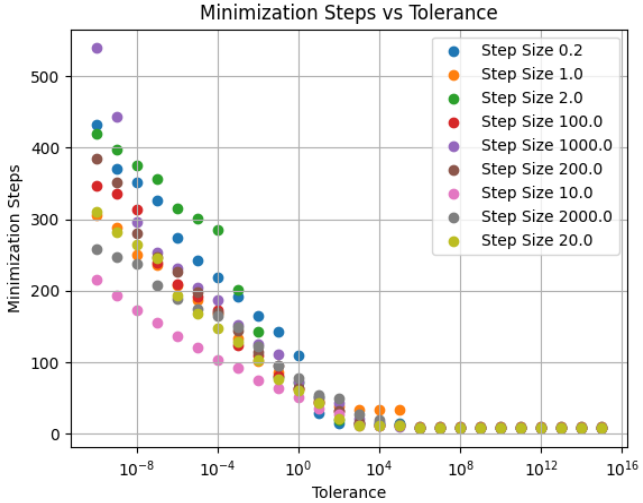
"NLL" = $(a-x)^2 + (b-y)^2 + c*\sin(a) + d*\sin(y) + e$ + discontinuities



Tolerance: 0.01
Step Size: 10

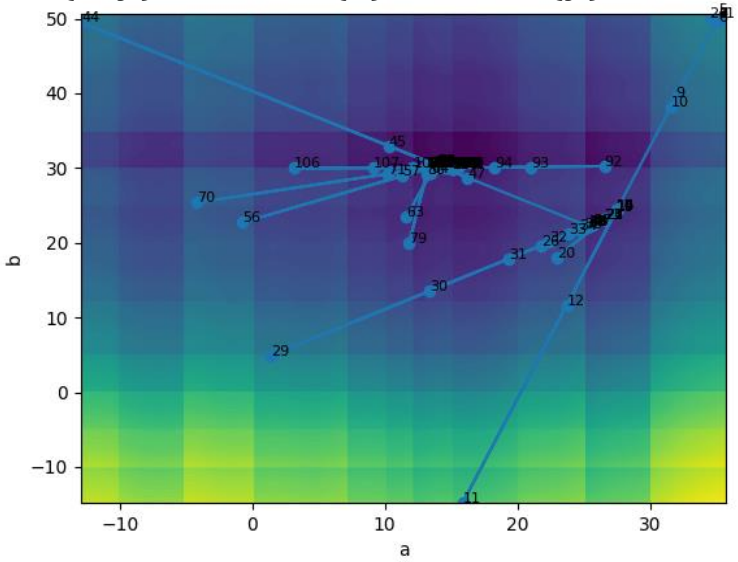


"The minimiser fails to find the global minimum every time"

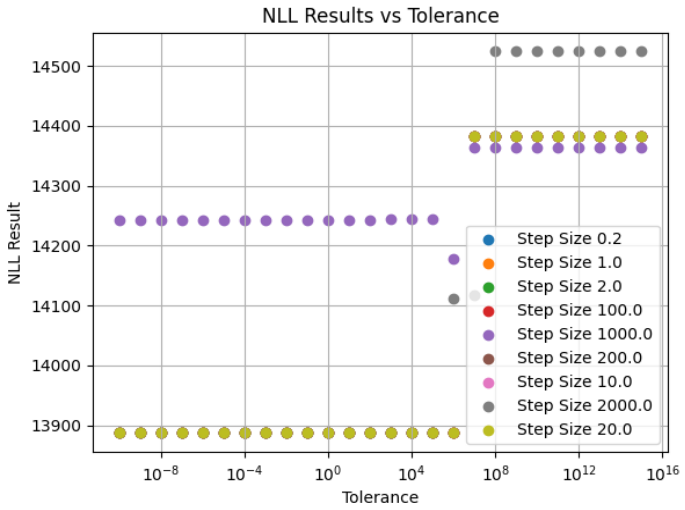


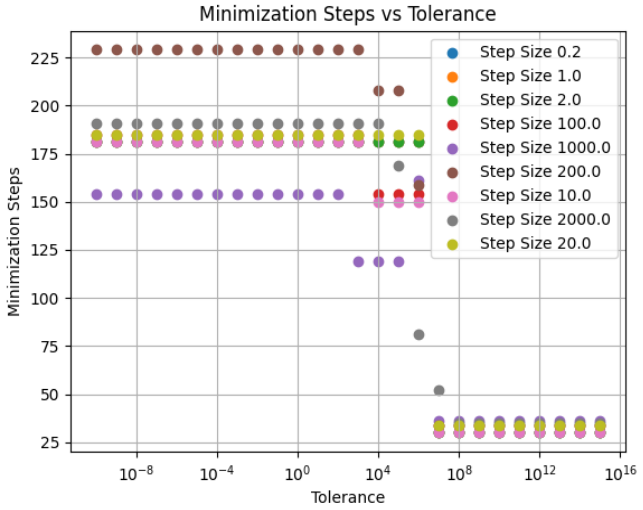
2D Fit Example (MIGRAD)

"NLL" = $(a-x)^2 + (b-y)^2 + c*\sin(a) + d*\sin(y) + e$ + discontinuities



Tolerance: 0.01
Step Size: 10





Conclusion

- Different functions, seeds, and fit parameters give different results.
- Generally, the drop off in the number of minimsation steps and the worsening in fit quality occur at similar tolerances
- MIGRAD and SIMPLEX should be tuned to different tolerances / step sizes