Command notebook for plotting code python scripts/generate\_plots.py --target IONQ --peers RGTI,QUBT,QBTS --asof 2025-08-29 --weight-mode corr\_ul --out-dir plots/IONQ\_2025-08-29\_ul

python scripts/generate\_plots.py --target IONQ --peers RGTI,QUBT,QBTS --asof 2025-08-29 --weight-mode corr\_iv\_atm --out-dir plots/IONQ\_2025-08-29\_atm

python scripts/generate\_plots.py --target IONQ --peers RGTI,QUBT,QBTS --asof 2025-08-29 --weight-mode corr\_surface --out-dir plots/IONQ\_2025-08-29\_surface

for term smile, plot peers as well

ensure that the defailt text and label zie for plots is larger than it is right now for downloads just because i can't see anything

python src/fetch\_data\_sqlite.py --db data\iv\_data\_1h.db --tickers IONQ RGTI QUBT QBTS --force --start 2025-01-01 --end 2025-08-27

python scripts/generate\_plots.py --target IONQ --peers RGTI,QUBT,QBTS --asof 2025-08-29 --max-expiries 8 --weight-mode corr\_surface\_grid --no-cache --out-dir plots/IONQ\_surface\_corr

python scripts/generate\_plots.py --target IONQ --peers RGTI,QUBT,QBTS --asof 2025-08-29 --max-expiries 8 --weight-mode pca\_surface\_grid --no-cache --out-dir plots/IONQ\_surface\_pca

python scripts/run\_plots.py --db data/iv\_data\_1m.db --timeframe 1m --tickers QBTS IONQ RGTI QUBT --start 2025-06-02 --end 2025-08-06 --rolling-target IONQ

python scripts/generate\_plots.py --target IONQ --peers RGTI,QUBT,QBTS --asof 2025-08-29 --max-expiries 8 --weight-mode corr\_surface\_grid --no-cache --out-dir plots/IONQ\_surface\_grid

python scripts/show\_corr\_rows.py --tickers QUBT QBTS --start 06-02-2025 --end 06-03-2025 --db data/iv\_data\_1m.db --tolerance 2s

* python -c "import sys; sys.path.insert(0,'.'); from analysis.compositeETFBuilder import build\_surface\_grids; import pandas as pd;
* g=build\_surface\_grids(['IONQ','RGTI','QUBT','QBTS']); print({t: list(map(str, sorted(g.get(t,{}).keys())))[] for t in ['IONQ','RGTI','QUBT','QBTS']})"

How to run

* Train/evaluate on surface tensors (1m example):

python src/main\_runner.py --tickers QBTS IONQ RGTI QUBT --start 2025-06-02 --end 2025-08-06 --timeframe 1m --use-surface --surface-k-bins 12 --surface-t-bins 8 --surface-agg median

* Generate plots + surface weights:

python scripts/run\_plots.py --tickers QBTS IONQ RGTI QUBT --start 2025-06-02 --end 2025-08-06 --db data/iv\_data\_1m.db --timeframe 1m --surface-weights-target IONQ --surface-k-bins 12 --surface-t-bins 8 --surface-agg median

Outputs

* Models: outputs/models/pooled\_{iv\_ret\_fwd|iv\_clip}\_<ts>.json
* Evaluations: outputs/evaluations/\*\_evaluation.json with RMSE/R2
* Plots: surface correlation heatmap and optional surface weights bar/CSV in plots/

Want me to add a surface-mode evaluator hook into scripts/run\_plots.py to inspect surface-model results (e.g., reading the new \*\_evaluation.json files), or to dump feature importances from the surface models too?

**Interpretation of 1-minute vs 1-hour correlations**

* **At 1-minute granularity (first figure you showed):**
  + Both **IV levels and returns correlations are near zero**.
  + Implied vol for these tickers moves essentially independently in ultra-short timeframes.
  + Suggests **no immediate co-movement**, meaning option markets are not reacting in lockstep minute to minute.
* **At 1-hour granularity (second figure you just uploaded):**
  + **Level correlations** are stronger (e.g., IONQ–RGTI ~0.47, IONQ–QUBT ~0.47).
  + **Return correlations** also show moderate co-movement (IONQ–QUBT ~0.27, RGTI–QUBT ~0.34).
  + This indicates that over longer horizons, **common factors start to show through** — the vol regimes between peers are somewhat aligned, and shocks in for overlay all, ensure that the target points are scattered lightlyticker are more likely to spill into others.

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| --- |
| python scripts/generate\_plots.py --target IONQ --peers RGTI,QUBT,QBTS --asof 2025-08-29 --weight-mode pca\_ul --out-dir plots/IONQ\_ul\_pca |
| python scripts/generate\_plots.py --target IONQ --peers RGTI,QUBT,QBTS --asof 2025-08-29 --weight-mode pca\_iv\_atm --out-dir plots/IONQ\_atm\_pca |
| python scripts/generate\_plots.py --target IONQ --peers RGTI,QUBT,QBTS --asof 2025-08-29 --weight-mode pca\_surface --out-dir plots/IO & venv/Scripts/python.exe src/rolling\_surface\_eval.py --tickers IONQ QUBT RGTI QBTS --target IONQ --start 2025-06-02 --end 2025-06-06 --db data/iv\_data\_1m.db --window 390 --surface-mode full --plot-metrics --plot-weights --weights-method corr --save-csv --plots-dir plotsNQ\_surface\_pca |

python scripts/generate\_plots.py --target IONQ --peers slide10\_peers --asof 2025-08-28 --weight-mode corr\_iv\_atm --slide10-smile --slide10-days 28 --slide10-ci 68 --out-dir outputs

src/rolling\_surface\_eval.py --tickers “IONQ, QUBT, QBTS, RGTI” --target IONQ --start 2025-06-02 --end 2025-06-06 --db data/iv\_data\_1m.db --window 390 --surface-mode full --plot-metrics --plot-weights --weights-method corr --plots-dir plots --export-dpi 300 --export-formats png --save-csv

src/rolling\_surface\_eval.py --tickers IONQ QUBT RGTI QBTS --target IONQ --start 2025-06-02 --end 2025-08-06 --db data/iv\_data\_1m.db --window 390 --surface-mode full --plot-metrics --plot-weights --weights-method corr --save-csv --plots-dir plots

python scripts/run\_all\_plots.py --target IONQ --peers "RGTI, QUBT, QBTS" --asof 2025-09-02 --max-expiries 12 --out-root output/903\_b

in run plots, create a plot for synthetic overlays that does a smile plot with correlation: IV ATM, surface, UL, and then PCA methods for IV ATM, surface, and IV