Paper Edits and Journal Comparisons

Matt Zhang | April 05, 2019

Paper Edits

Text Changes

Added to intro → first time doing a full hyperparameter scan to study classification and regression in a systematic way; a focus on applications in different architectures with studies on ATLAS and CMS geometry.

Expanded resampling section to explain CMS results as due to CMS's focus on energy resolution rather than spatial granularity, which our resampling process cannot replicate. Now saying CMS-like calorimeter cell geometry rather than just CMS, for political reasons.

Edited references to when HCAL is used in architectures.

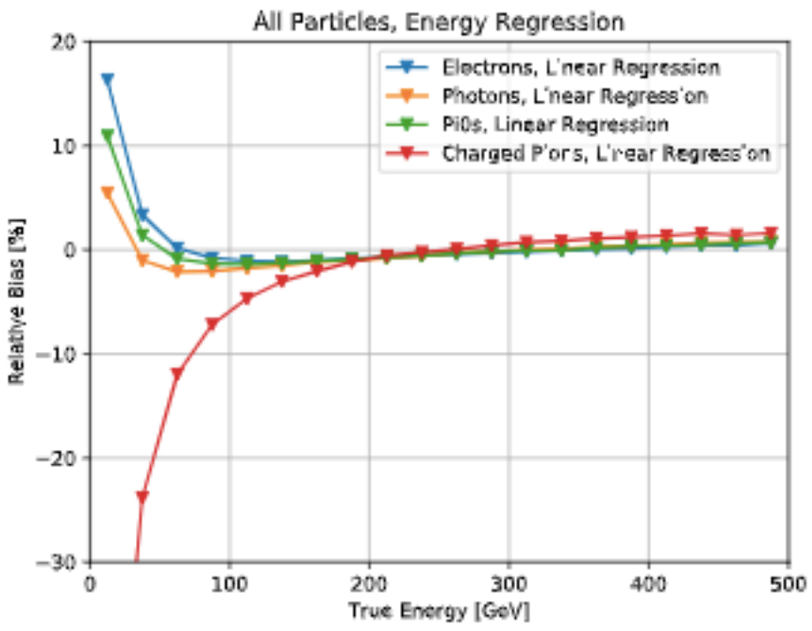
Need to do: remove all remaining references to NIPS.

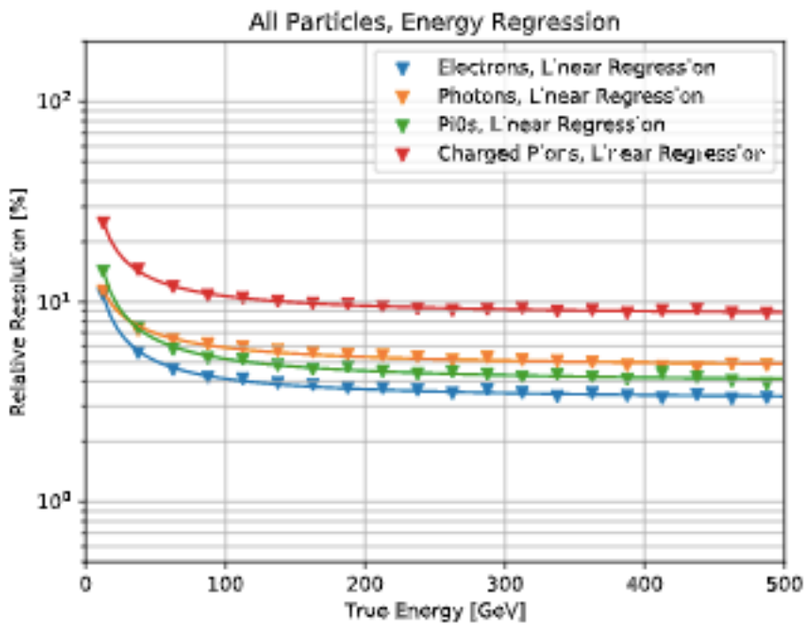
Energy Linear Regression Equation

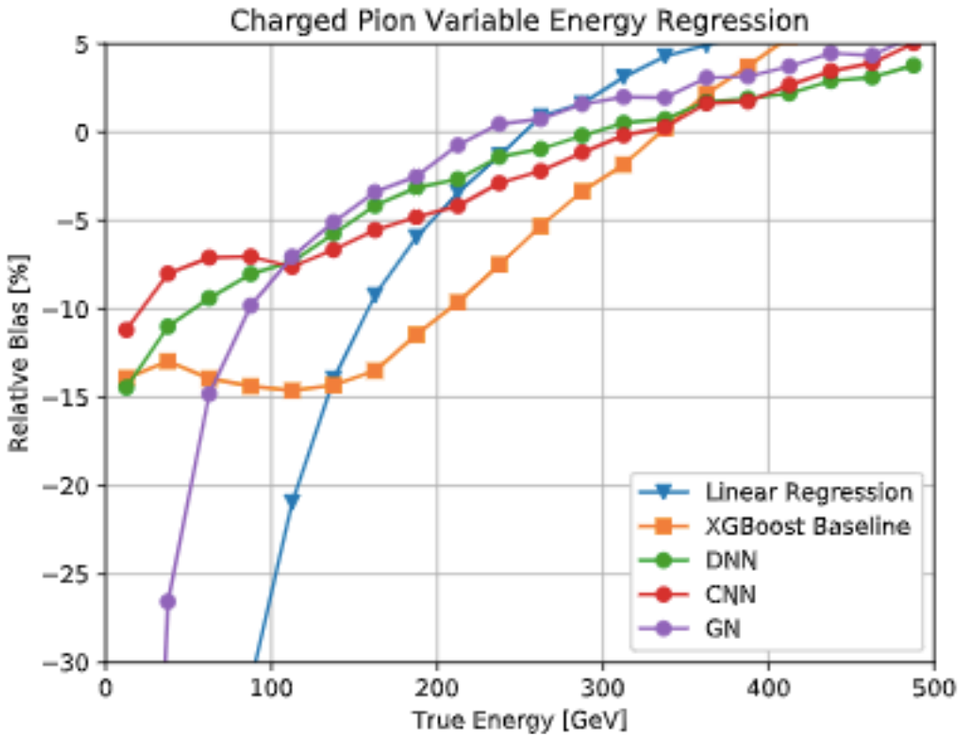
Linear regression equation is
a * HCAL_E + b * ECAL_E + c
and Appendix G now reflects this.

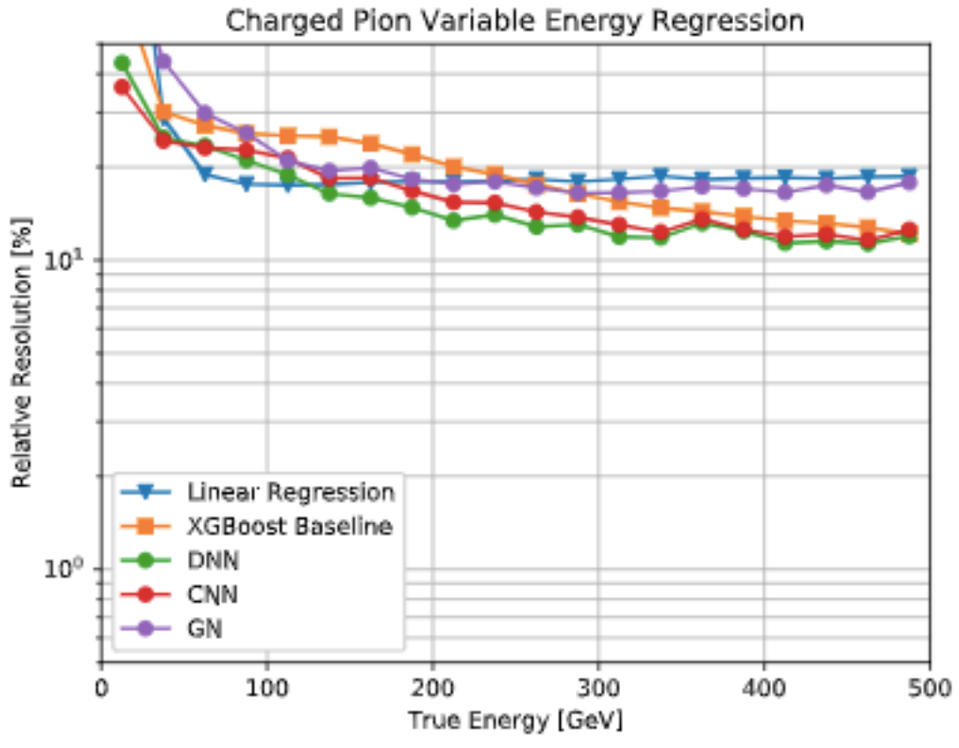
The equation given below refers to the bias and resolution performances of this baseline.

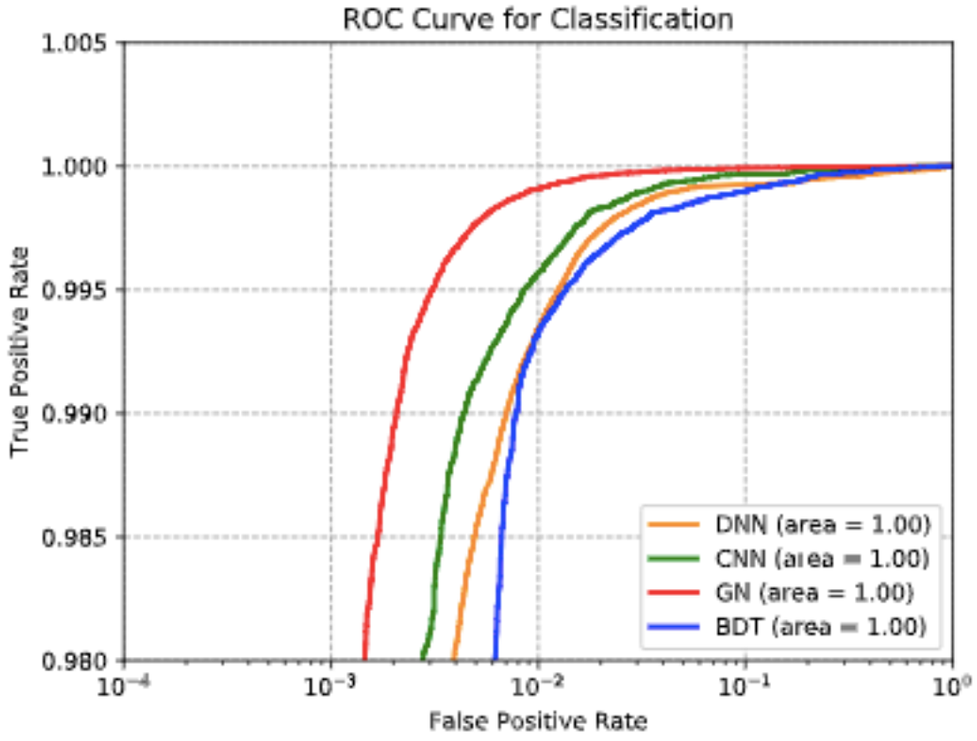
$$\frac{\sigma(\Delta E)}{E_{\text{true}}} = \frac{a}{\sqrt{E_{\text{true}}}} \oplus b \oplus \frac{c}{E_{\text{true}}} \tag{1}$$







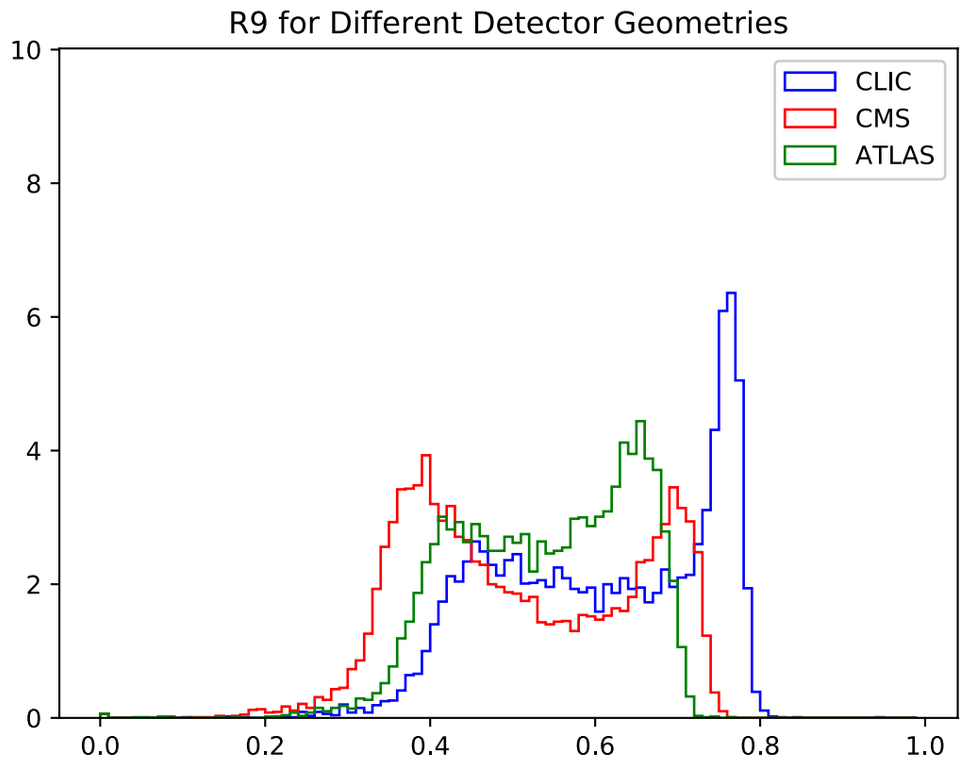


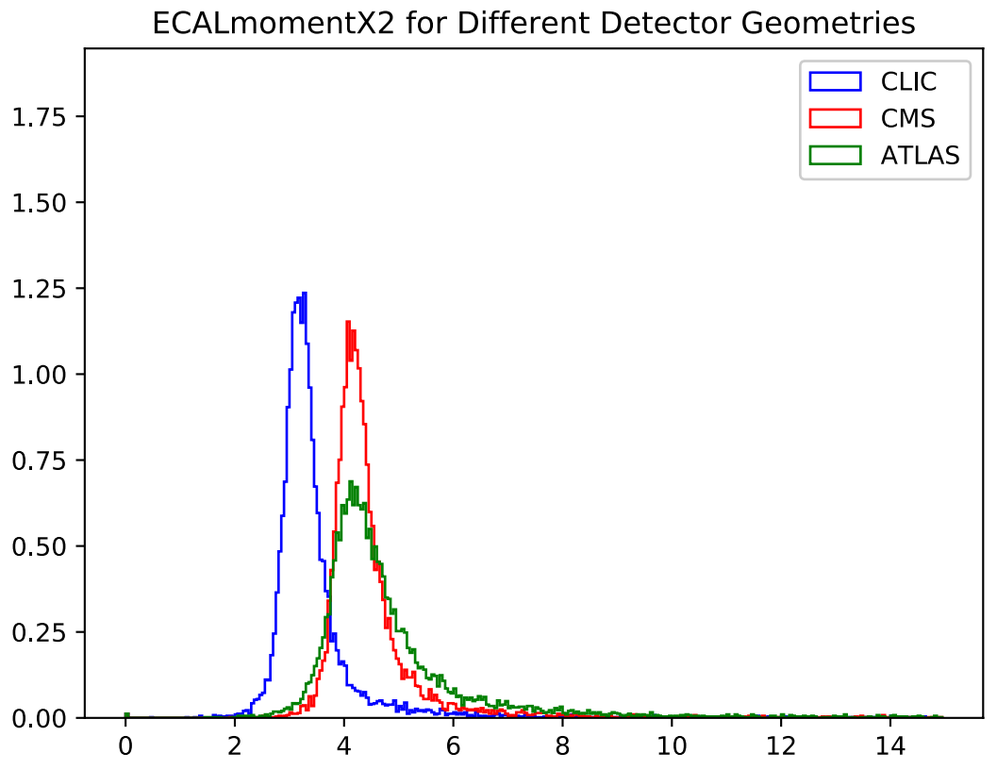


HCAL turns out to be present in DNN and CNN - only missing in GN. Updated description in paper. Will possibly add architecture diagrams later.

This demonstrates that poor ChPi regression is not due solely to lack of HCAL. Probably not worth it to tune and train a GN architecture with HCAL included.

We wanted to demonstrate that poor separation in classification architectures when resampling to CMS architecture was due to poor spatial resolution. Do these plots demonstrate that?





Unable to replace baselines on Figure 16 with dashed lines. I do not have the original fixed-angle samples used to generate this plot (plot originally made by Dominick).

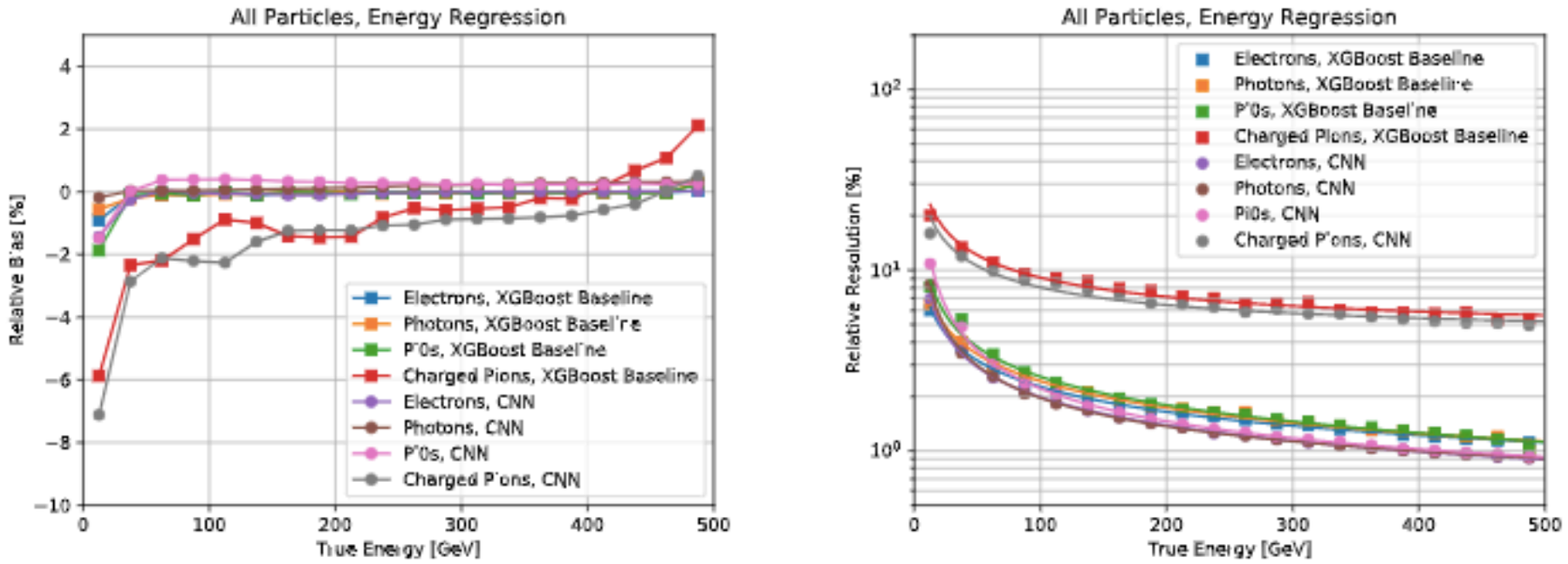
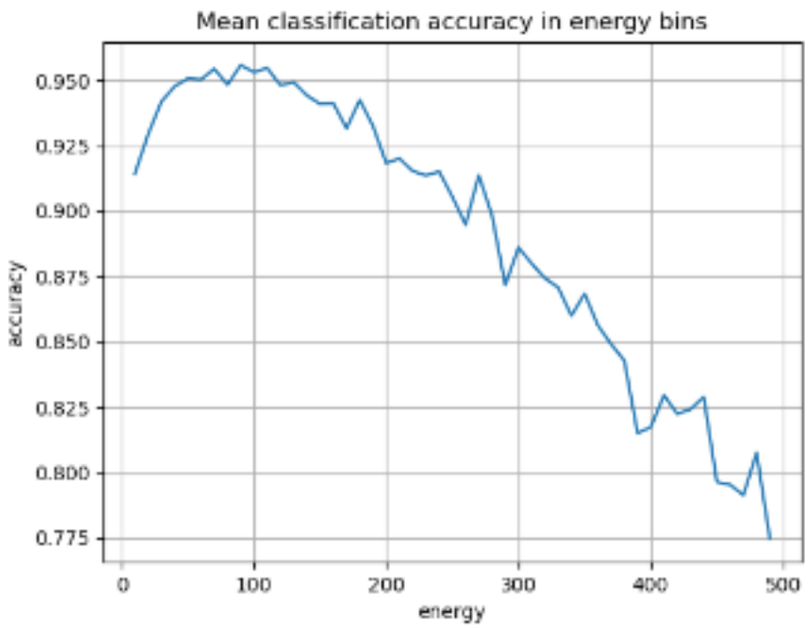
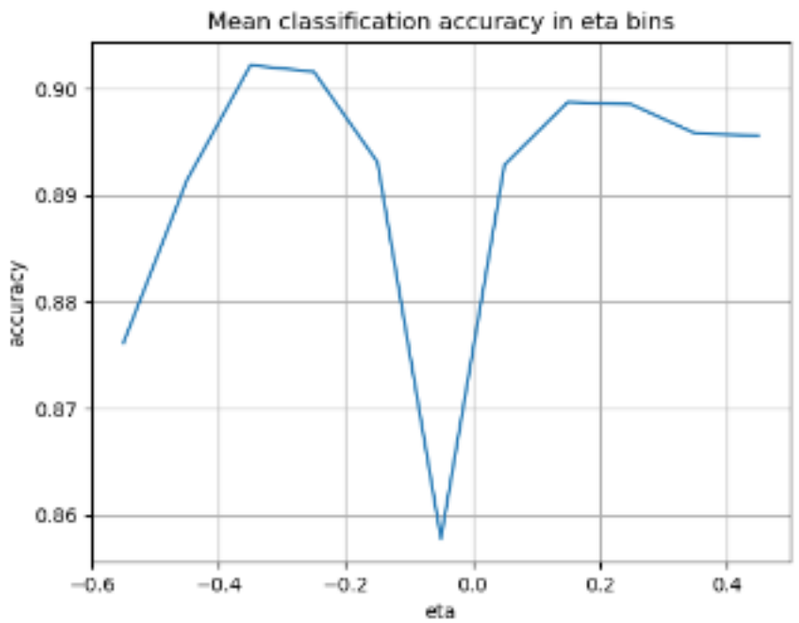


Figure 16: (Left) Bias and (right) resolution as a function of true energy for energy predictions for all particles, comparing the XGBoost baseline with the best CNN model, on fixed-angle samples.

Still working on updating Figures 6 and 7. I no longer have the GN classification nets used to generate these plots, so I'm retraining them.





Journal Comparisons

Potential Journals

Name	link	example papers	impact factor	page requirement	notes
JINST	https://jinst.sissa.it/jinst/help/helpLoader.jsp?pgType=about	https://iopscience.iop.org/article/10.1088/1748-0221/13/11/P11020 https://iopscience.iop.org/article/10.1088/1748-0221/11/09/P09001 https://iopscience.iop.org/article/10.1088/1748-0221/13/08/P08023	1.310	https://jinst.sissa.it/jinst/help/JINST/TeXclass/jinst-author-manual.pdf (no limit?)	
JHEP	https://jhep.sissa.it/jhep/	https://link.springer.com/article/10.1007/JHEP10(2018)093 https://link.springer.com/article/10.1007/JHEP10(2018)101 http://inspirehep.net/record/1501944?ln=en	5.541	https://jhep.sissa.it/jhep/help/helpLoader.jsp?pgType=author (no limit?)	Nachman's preferred journal
PRD	https://journals.aps.org/prd/	https://journals.aps.org/prd/abstract/10.1103/PhysRevD.97.014021 https://journals.aps.org/prd/abstract/10.1103/PhysRevD.98.076017 https://journals.aps.org/prd/abstract/10.1103/PhysRevD.99.033004	4.506	https://journals.aps.org/prd/authors (4500 words)	
PRL	https://journals.aps.org/prl/	https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.120.042003 https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.114.111801 https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.121.241803	8.462	https://journals.aps.org/prl/authors (3750 words)	
Computing and Software for Big Science	https://www.springer.com/physics/particle+and+nuclear+physics/journal/41781	https://link.springer.com/article/10.1007/s41781-017-0004-6 https://link.springer.com/article/10.1007/s41781-018-0015-y https://link.springer.com/article/10.1007/s41781-018-0007-y	?	https://www.springer.com/physics/particle+and+nuclear+physics/journal/41781?detailsPage=pltci_3141211 (no limit?)	new yearly journal (2017)