Small systems with JEWEL and *Trajectum*

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ALICE: 2211.04384

ATLAS: 1910.13978

ATLAS: 2206.01138

A phrasing

What is non-flow?

Is the signal too small

Unclear interpretation
n small systems

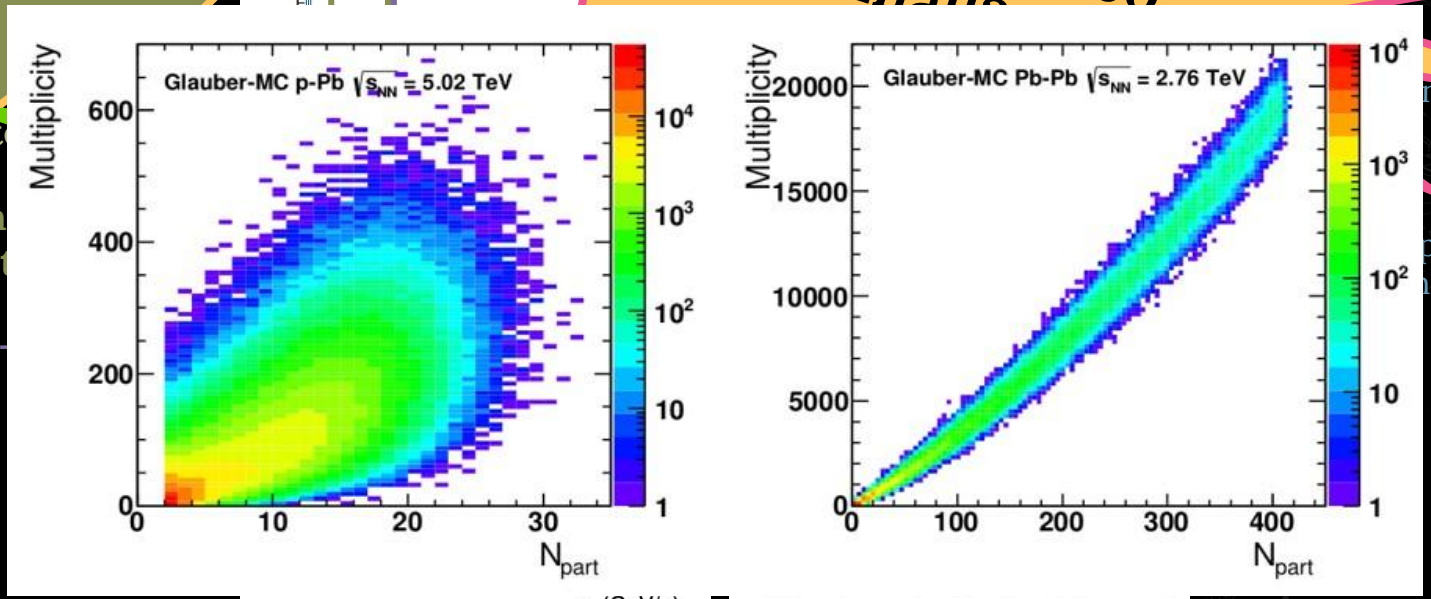
tion of v_2
n-trivial AA

profile

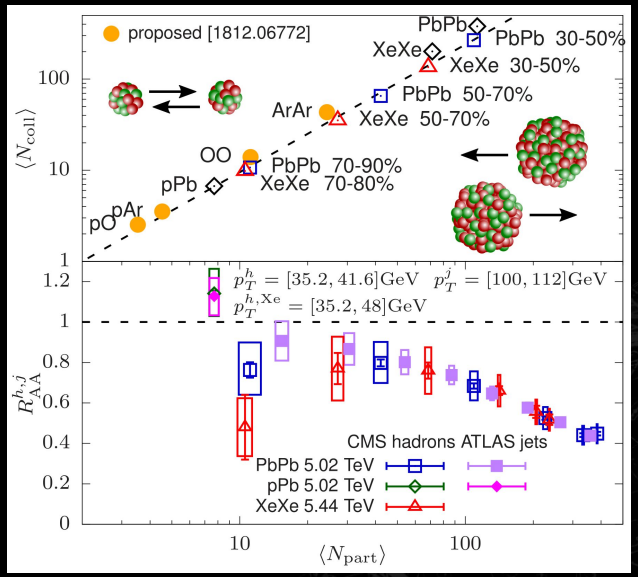
Multiple int

Kinetic tran
Few interact

Path length-
energy loss



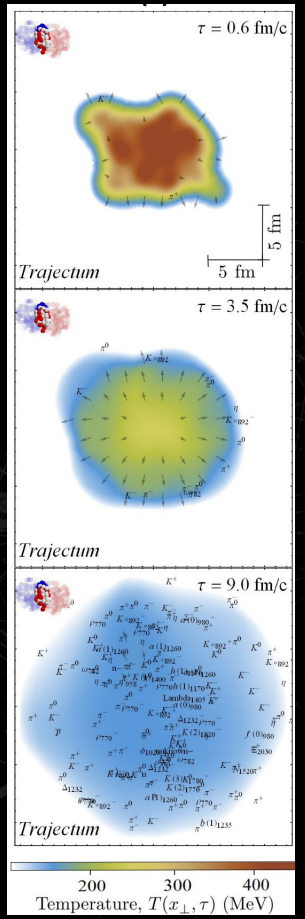
Oxygen-Oxygen - a controlled small system



Let’s build a model

Trajectum

- Utrecht / CERN / MIT
- Contains:
  - Initial stage (Trento)
  - pre-equilibrium
  - Hydrodynamics
  - Freeze-out
  - Hadron phase
- Fast
- Bayesianized parameter lists

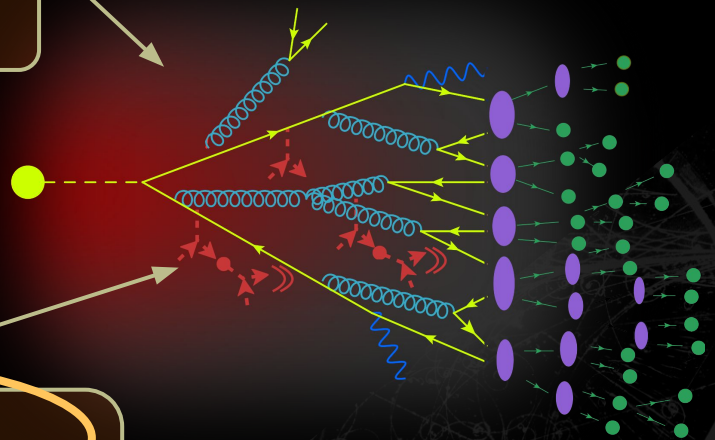


Jets - JEWEL

1. Production:
Sample energy density distribution of collision

Use PYTHIA to generate particles

2. Vacuum Radiation



3. In-medium radiation:
Sample medium model to get T.

Use EoS and 2 – 2 scattering matrix + parton shower

4. Give evolved jet and all radiated partons back to PYTHIA for full event generation

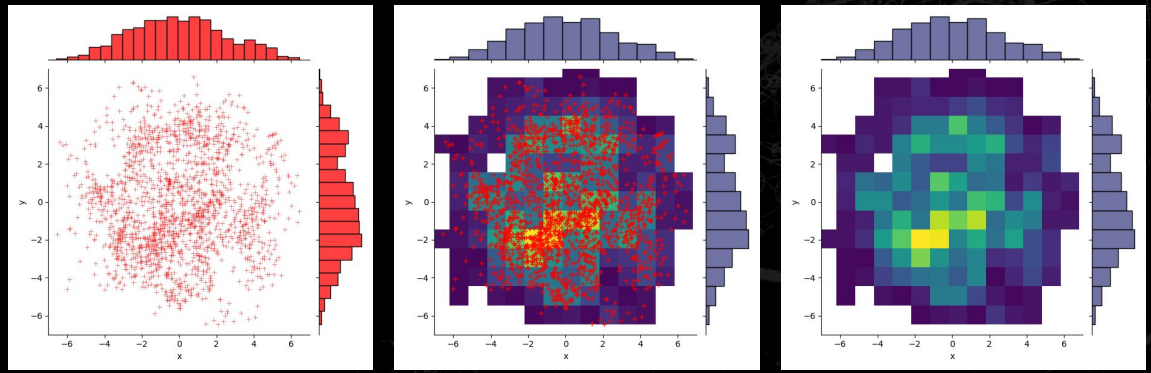
Hydro interface for JEWEL

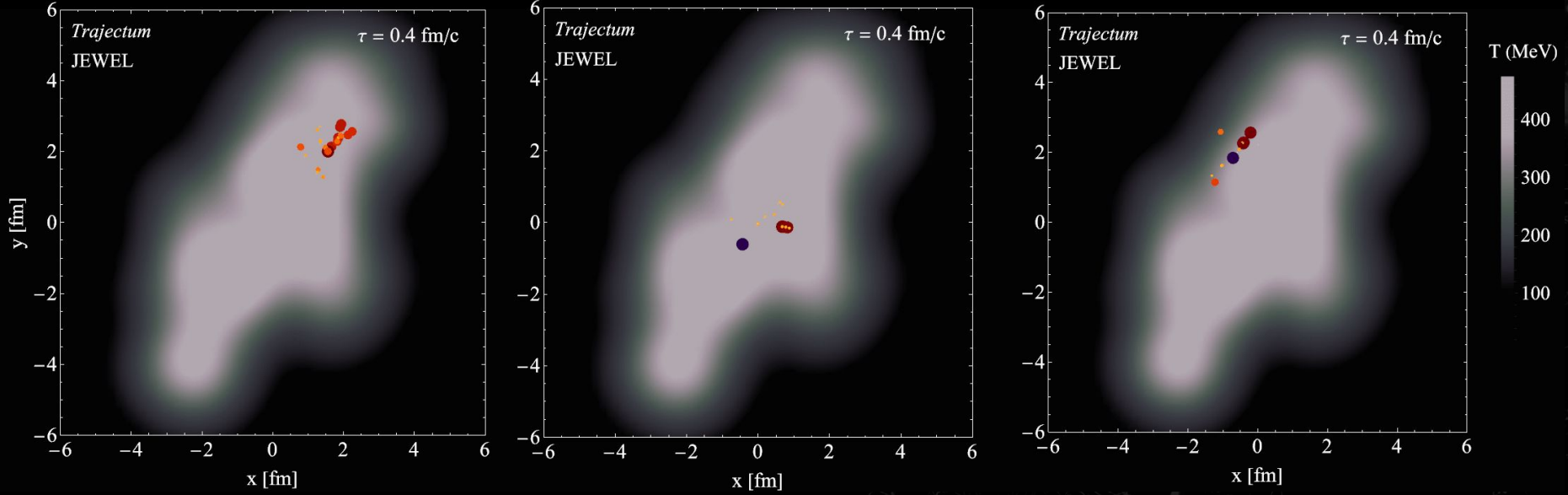
```
gh repo clone isobelkolbe/jewel-2.4.0-2D
```

New jewel-2.4.0-hydro-2D:

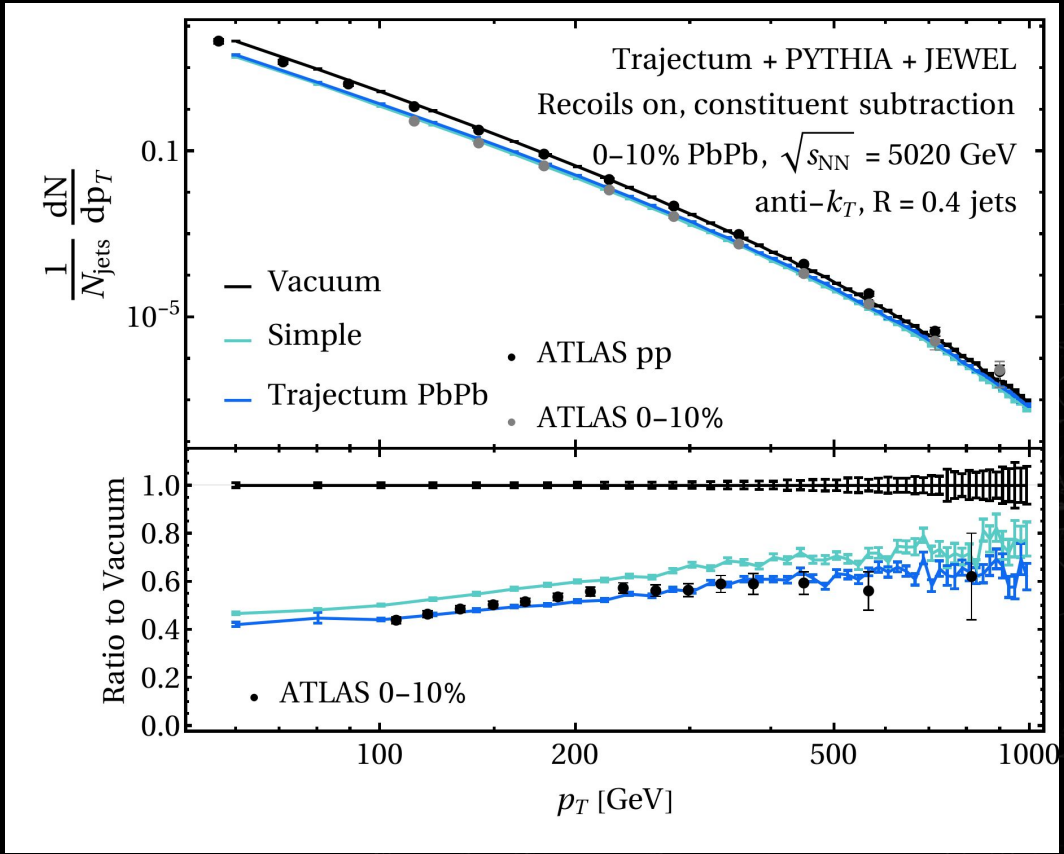
- Built on jewel-2.4.0-simple
  - Similar use of temperature and velocity for scattering centers
  - Similarly separable from main jewel code.
- Can include *any* (2+1)D background with T and (u_x, u_y) information
- Jet production location from N_{coll} information
- Subtleties with density determination

$$n_{eff} = \frac{n_0}{\cosh\eta - \sinh\eta\cos\theta}$$



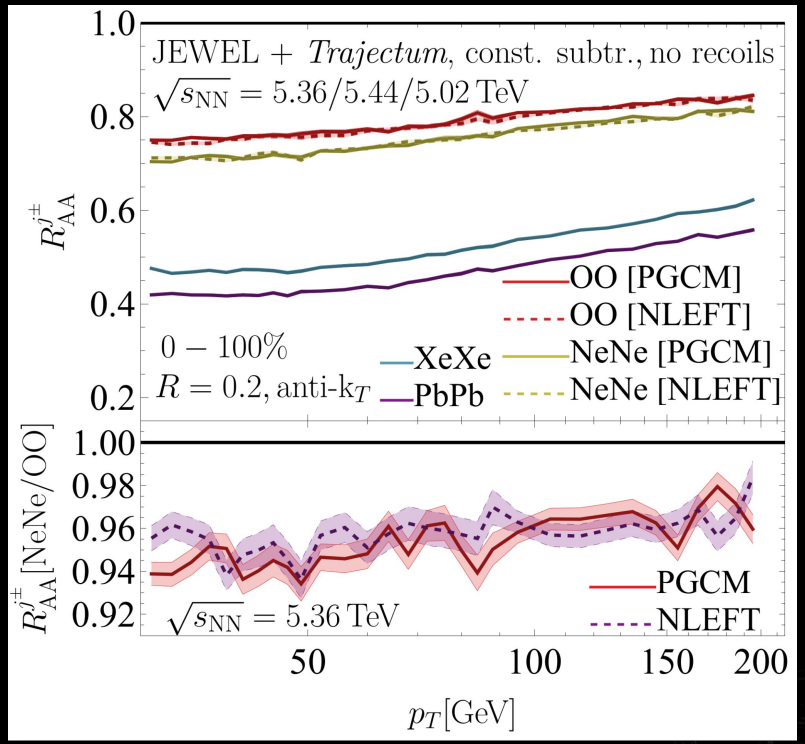

Trajectum
JEWEL
τ = 0.4 fm/c
y [fm]
x [fm]
T (MeV)
400
300
200
100

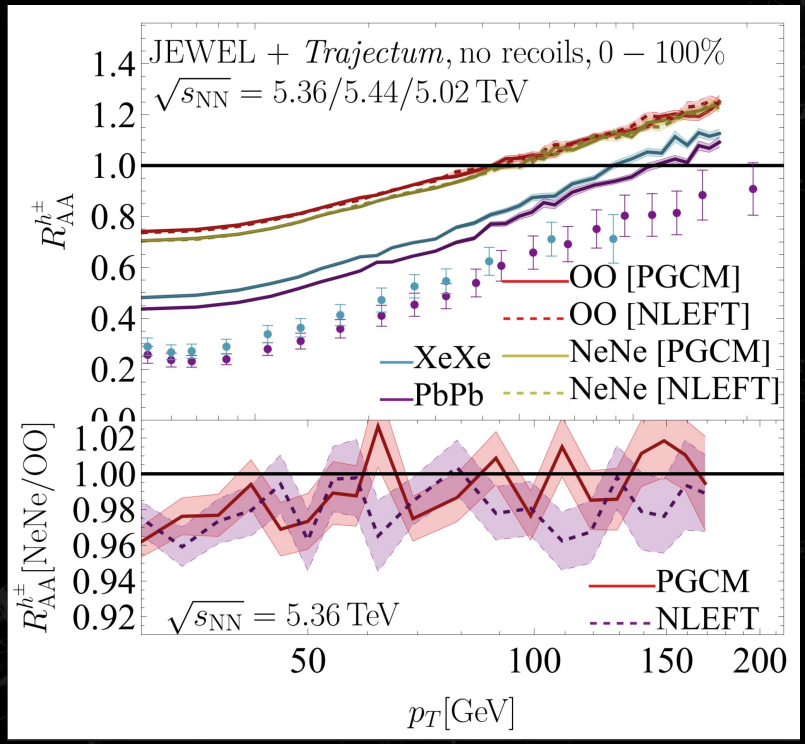
$$R_{\mathrm{AA}}(p_{\mathrm{T}}) = \frac{1}{\langle T_{\mathrm{AA}} \rangle} \frac{dN_{AA}/dp_{\mathrm{T}}}{d\sigma_{pp}/dp_{\mathrm{T}}}$$



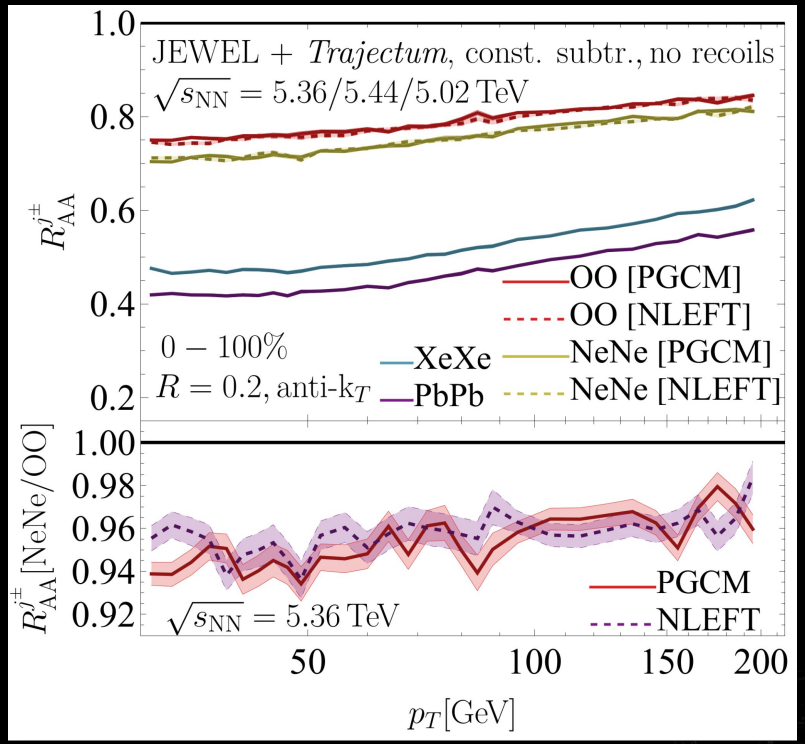
OO and NeNe

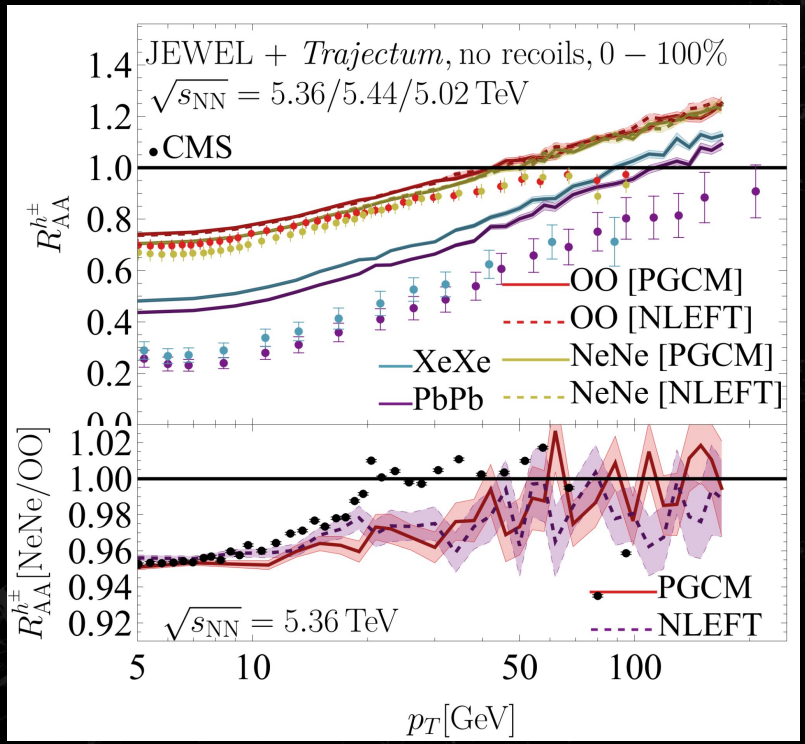
OO and NeNe predictions





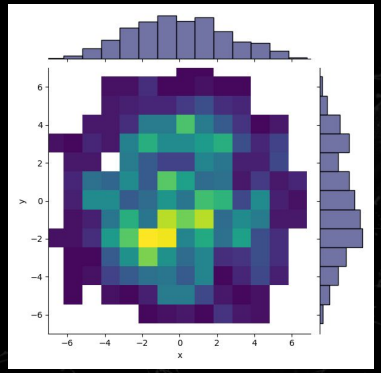
OO and NeNe predictions

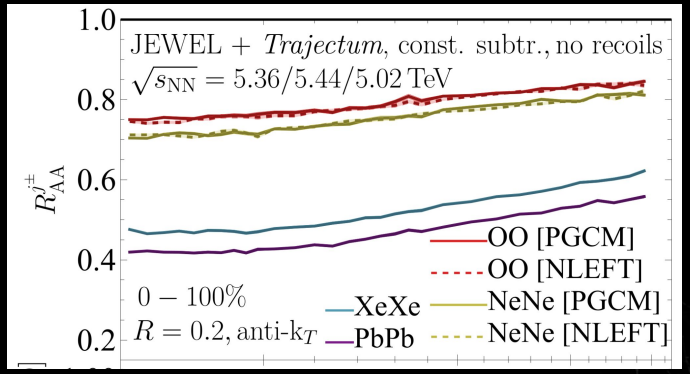


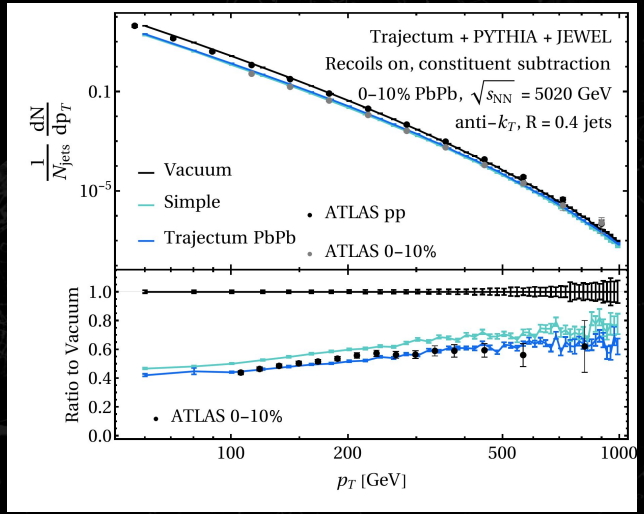


Summary & Conclusions

- Hydro plugin for JEWEL
- Can include full EBE fluctuations
- Proof of concept in PbPb
- OO and NeNe

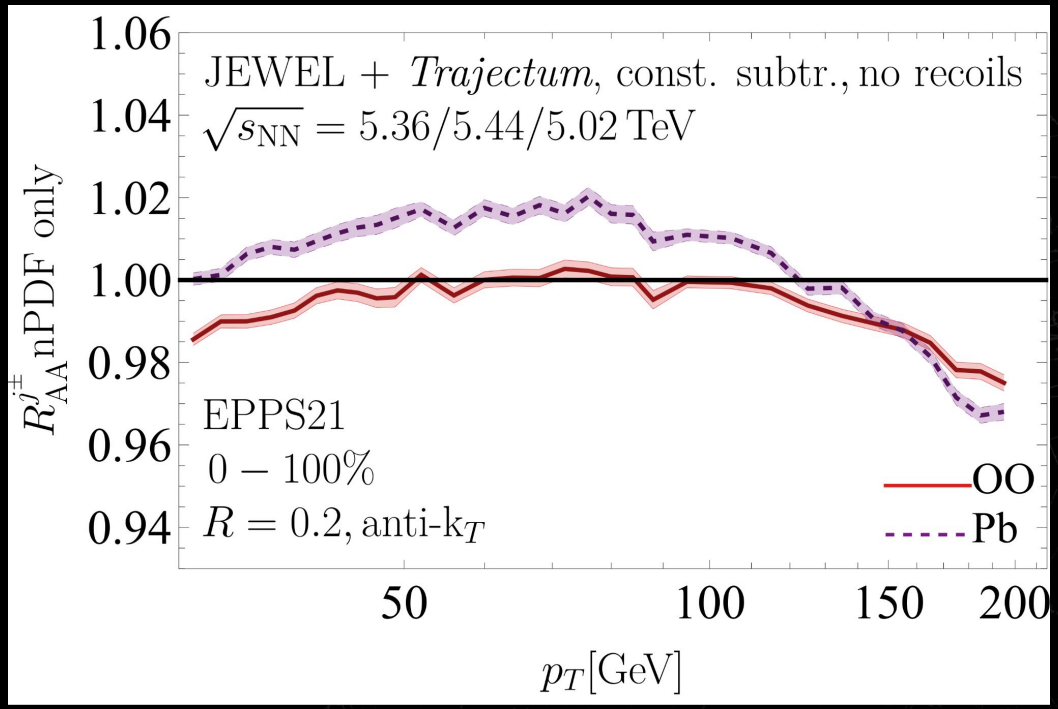


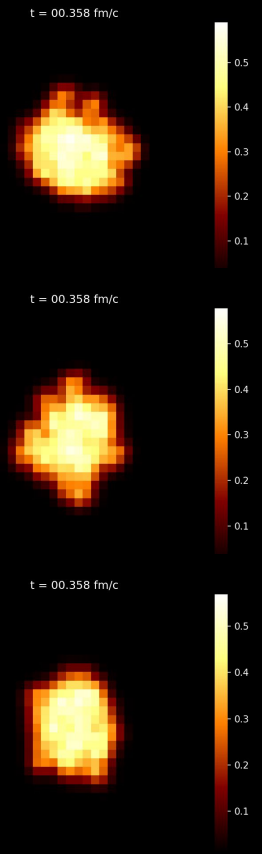




Backups

No-quenching scenario

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0.5
0.4
0.3
0.2
0.1
t = 00.358 fm/c
0.5
0.4
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t = 00.358 fm/c
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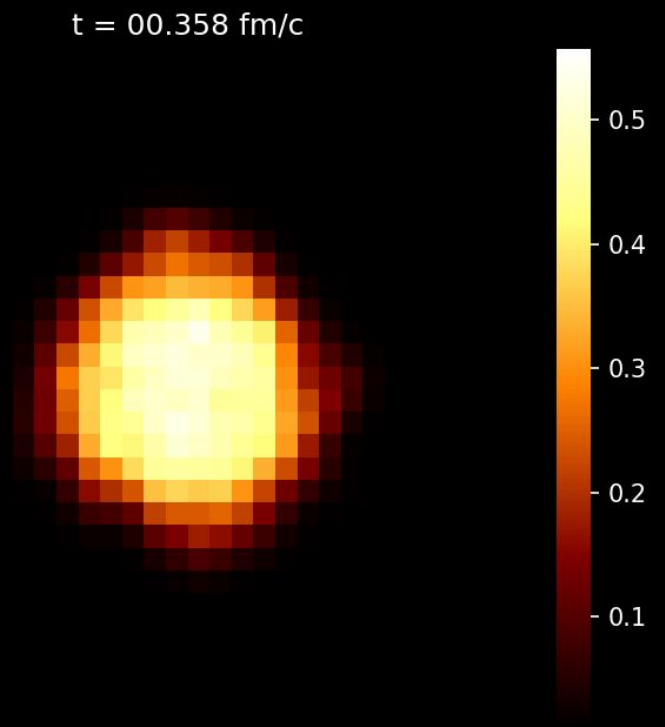
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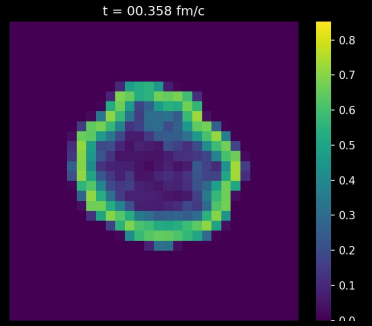
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0.6
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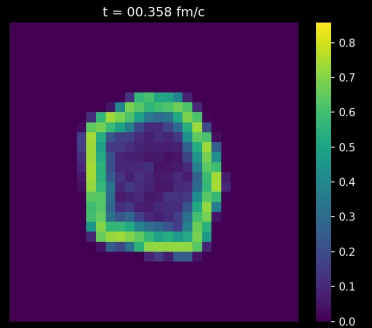
t = 00.358 fm/c
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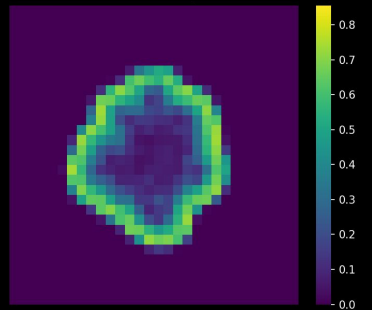
0.8
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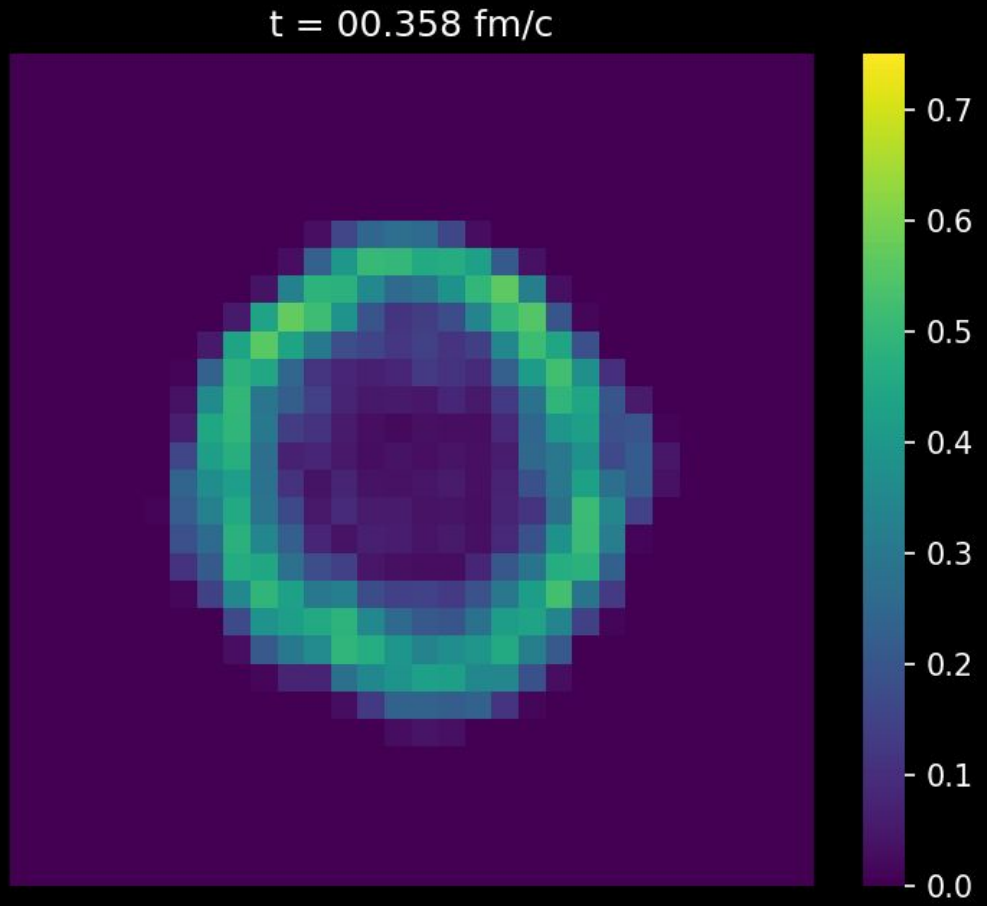
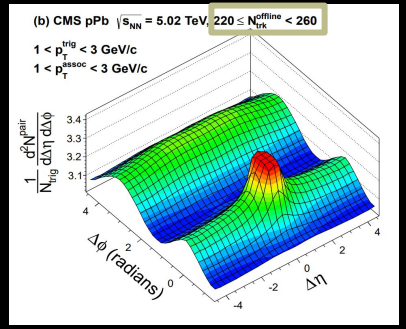
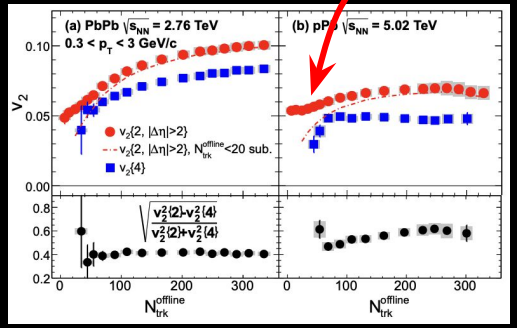

t = 00.358 fm/c
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

R_{AA}, v_2 , and Centrality





Subtract low mult-data (match ATLAS)

$N_{trk}^{offline}$ bin	PbPb data ⟨Centrality⟩ ± RMS (%)	⟨$N_{trk}^{offline}$⟩	⟨$N_{trk}^{corrected}$⟩	pPb data Fraction	⟨$N_{trk}^{offline}$⟩	⟨$N_{trk}^{corrected}$⟩
[0, ∞)				1.00	40	50±2
[0, 20)	92±4	10	13±1	0.31	10	12±1
[20, 30)	86±4	24	30±1	0.14	25	30±1
[30, 40)	83±4	34		0.12	35	42±2
[40, 50)	80±4	44	0-50%	0.10	45	54±2
[50, 60)	78±3	54		0.09	54	66±3
[60, 80)	75±3	69	87±4	0.12	69	84±4
[80, 100)	72±3	89		0.07	89	108±5
[100, 120)	70±3	109	0-10%	0.03	109	132±6
[120, 150)	67±3	134		0.02	132	159±7
[150, 185)	64±3	167	210±9	4×10^{-3}	162	195±9
[185, 220)	62±2	202	253±11	5×10^{-4}	196	236±10
[220, 260)	59±2	239	299±13	6×10^{-5}	232	280±12
[260, 300)	57±2	279	350±15	3×10^{-6}	271	328±14
[300, 350)	55±2	324	405±18	1×10^{-7}	311	374±16

0-30%

0-0.00631% bin