

# BeAGLE

---

Mark D. Baker

07-MAY-2020

# Serious Mistakes to Avoid!!

---

- Don't want to use a wrong model (DPMJET/BeAGLE) to drive EIC Detector/IR decisions!
- Don't want to let sloppy E665 data derail valid conclusions from BeAGLE if DPMJET & VENUS are correct.
- The situation is a bit alarming and we need clarity ASAP (As Soon As Possible).

# Cleanest measure of "forward" protons

Z. Phys. C 61, 179-198 (1994)

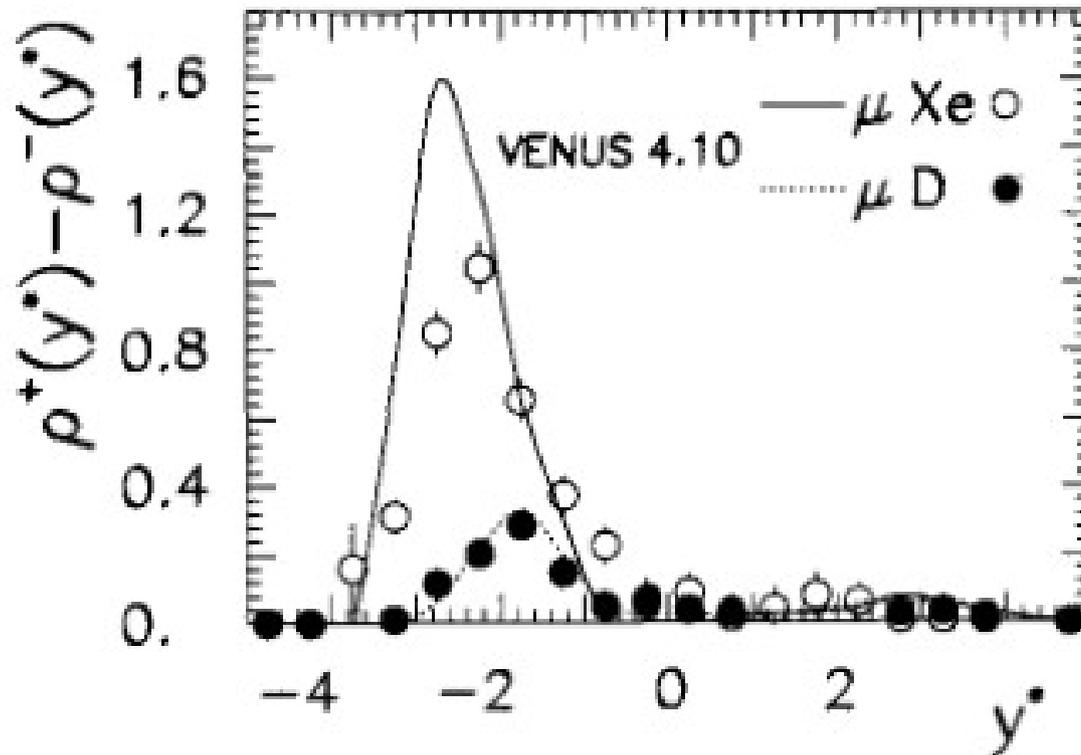
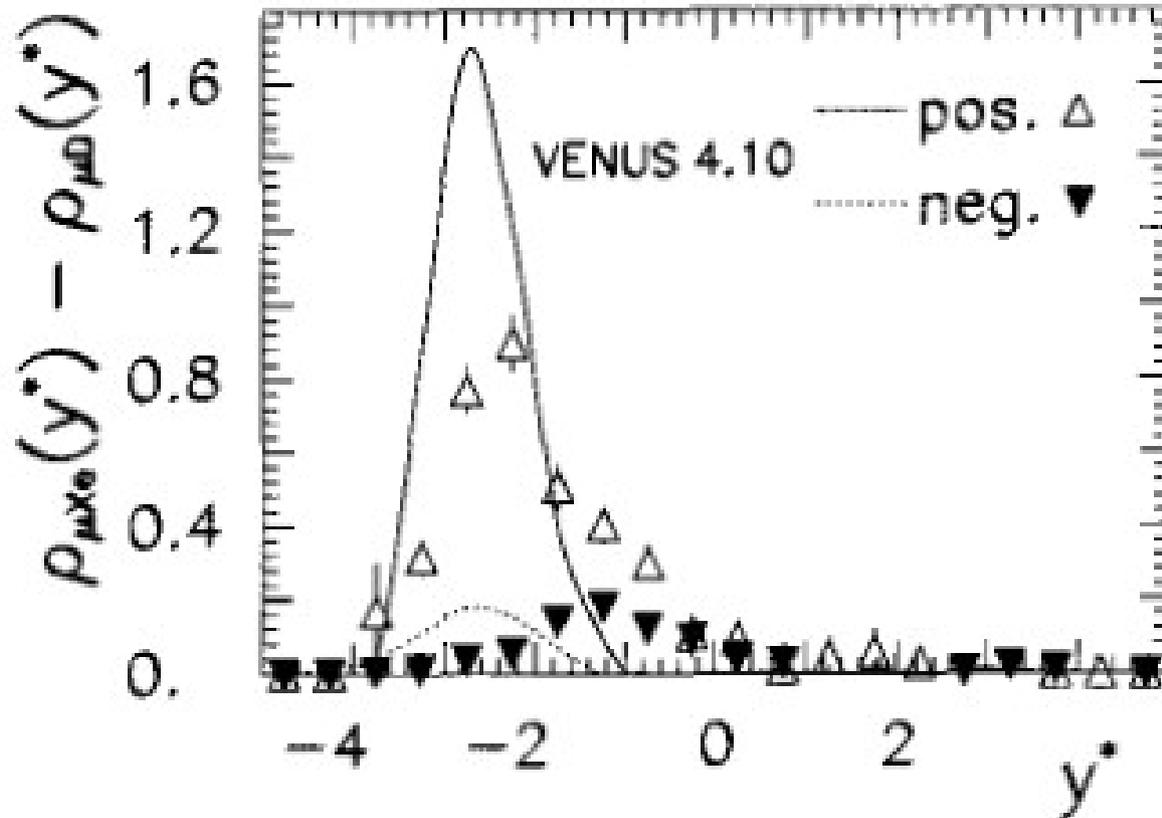


Fig. 25. Normalized cms-rapidity distribution of the hadronic net charge for  $\mu D$  (full circles) and  $\mu Xe$  scattering (open circles). The lines represent the predictions of the VENUS model

# Another measure of nuclear response

Z. Phys. C 61, 179-198 (1994)



**WARNING:**  
Possible  $e^+e^-$  pair  
contamination.

Or physics: BeAGLE  
does not model the  
case of  $\gamma^*$  colliding  
Inelastically with 2  
or more nucleons.

Plain DPMJET  
might. Or turn on in  
Pythia...

Fig. 26. Difference of the normalized cms-rapidity distributions between  $\mu Xe$  and  $\mu D$  scattering, for positive (open triangles) and negative hadrons (full triangles). The lines represent the predictions of the VENUS model

# Evaporation neutrons

Neutrons from Pb

PRL 80 (1998) 2020

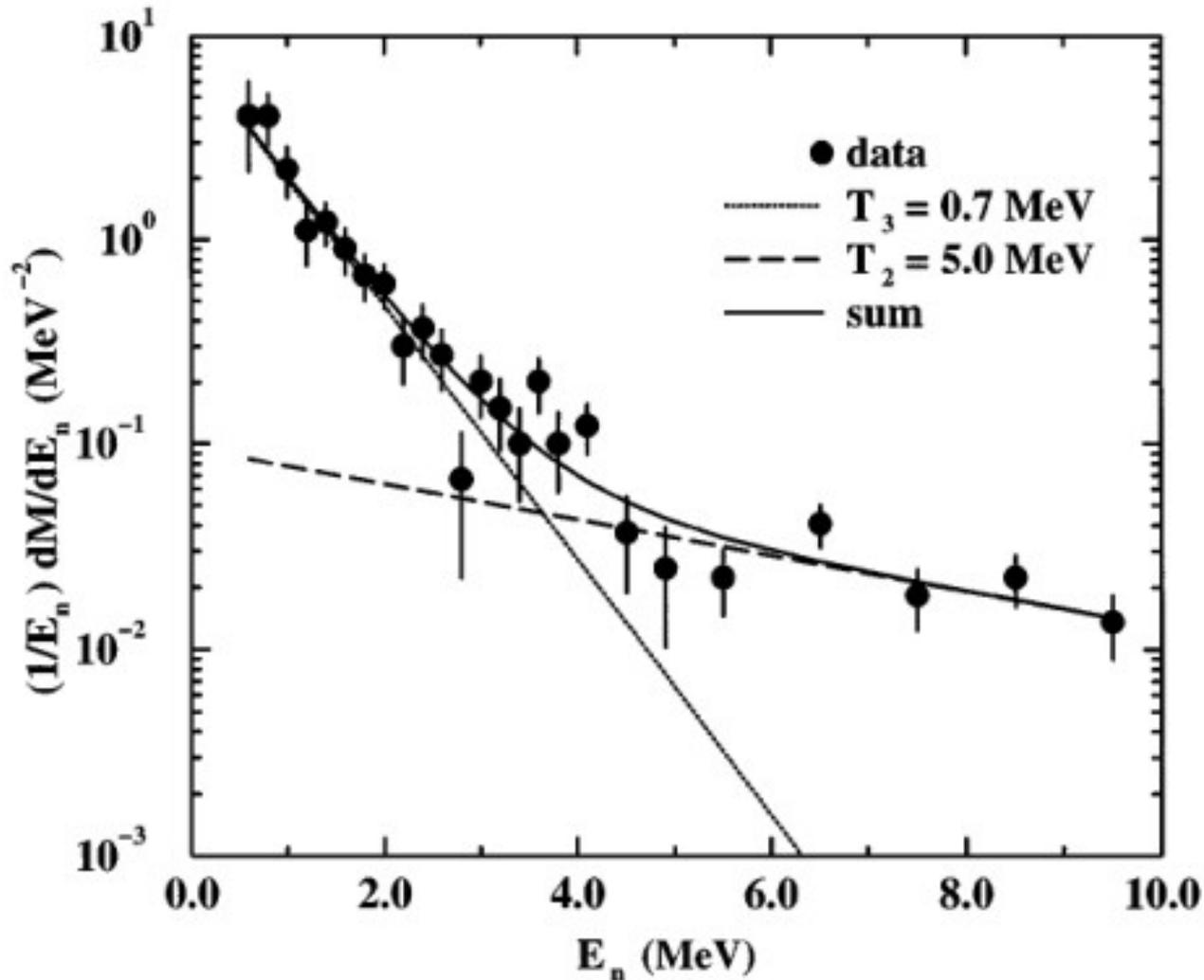


FIG. 1. The differential multiplicity  $(1/E_n)dM/dE_n$  as a function of neutron energy  $E_n$  for deep-inelastic muon scattering from a Pb target with  $\nu < 200$  GeV. The curves show the two-exponential fit to the data as described in the text.

# What else can we do?

---

- Intranuclear cascades and nuclear response are actually well studied in various emulsion experiments.
- Look into DPMJET and VENUS.
- What data validates those models?
  - Is there better data to check BeAGLE against?

# BeAGLE Tune

- Matched Elke's Pythia tunes:
  - `~mdbaker/BeAGLE/PythiaControl/S3ALL000` corresponds to Elke's:  
`input.data.ep_noradcor.20x250.eic.FF.Mark.NewRCPT.v1`
    - $\text{PARJ}(170)=\text{PARJ}(21)=\text{PARP}(91)=\text{PARP}(99)=0.32$
  - `~mdbaker/BeAGLE/PythiaControl/S3ALL001` corresponds to  
`input.data.ep_noradcor.20x250.eic.FF.Mark.NewRCPT`
    - $\text{PARJ}(170)=0.2$   $\text{PARJ}(21)=\text{PARP}(91)=\text{PARP}(99)=0.4$
  - Recall Elke's Pythia change:  $\text{PARJ}(170)$  controls remnant cluster breakup, not  $\text{PARJ}(21)$  which is now only string fragmentation  $p_T$

# Questions

---

- Are those the right ones or should I use `input.data.ep_noradcor.20x250.eic.FF.HERMES.VMD.Mark.NewRCPT?`
- Do these work or is there still an infinite loop?
- Have we checked the non-v1 tune? PARJ(170) may need tweaking...
- Is there any evidence of a difference between fixed target and "MOM" mode for pyinit?

# Differences between BeAGLE/Pythia tune

---

- $PARP(2)=2$  for BeAGLE vs.  $D=5$ 
  - Minimum collision  $s$  lowered
- $MSTU(16)=1$  (D) for BeAGLE vs. 2 for Pythia
  - Some change in event history mother/daughter pointers which I don't really understand.