8th Workshop of the APS Topical Group on Hadronic Physics

GHP 2019

APRIL 10-12, 2019 • DENVER, CO

THE GHP WORKSHOP PROVIDES GREAT OPPORTUNITIES FOR NUCLEAR AND PARTICLE PHYSICISTS TO MEET AND DISCUSS THEIR COMMON INTERESTS IN HADRONIC INTERACTIONS.

TOPICS INCLUDE:

- Light- and heavy-quark mesons & baryons
- Exotic hadrons
- Transverse and longitudinal structure of hadrons
- Hadron tomography and hadronization
- Neutrino-hadron interactions
- QCD effects in nuclei
- Physics of the quark-gluon plasma
- Physics of gluon saturation
- EFT approaches in hadron physics
- Lattice QCD and other non-perturbative approaches
- Future facilities

PROGRAM COMMITTEE:

Abhay Deshpande (Stony Brook University)
Tanja Horn (Catholic Univ of America)
Garth Huber (University of Regina) (co-chair)
Spencer Klein (Lawrence Berkeley National Lab)
Swagato Mukherjee (Brookhaven National Lab)
Paul Reimer (Argonne National Lab)
David Richards (Jefferson Lab) (chair)
Susan Schadmand (Forschungszentrum Juelich)
Anne Sickles (University of Illinois at Urbana-Champaign)
Ramona Vogt (Lawrence Livermore National Lab and UC Davis)

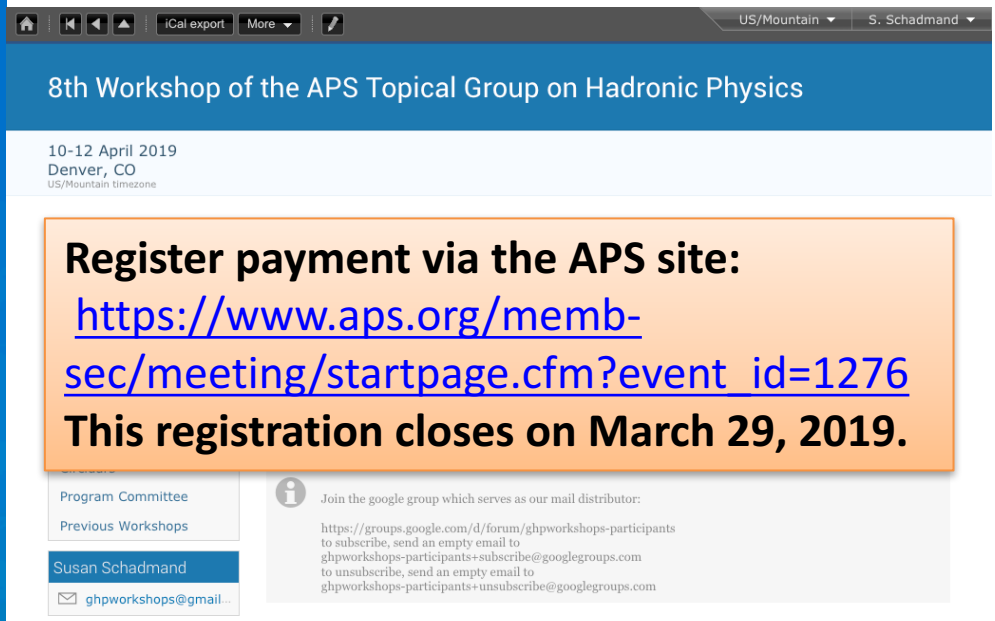
APS physics

The workshop immediately preceeds the APS April Meeting 2019 and will take place at the same venue.

contact: ghpworkshops@gmail.com
www.aps.org/units/ghp/meetings/meeting.cfm?name=GHP19

Jefferson Lab
BROOKHAVEN NATIONAL LABORATORY

https://www.jlab.org/indico/event/282/



Register payment via the APS site:
https://www.aps.org/memb-sec/meeting/startpage.cfm?event_id=1276
This registration closes on March 29, 2019.

also announcing:

QNP2021
20. - 24. September 2021
at the Conference center Gustav Stresemann Institut
Bonn, Germany

LOC:
Jim Ritman (FZ Juelich)
Klaus Peters (GSI Darmstadt)
Frank Maas (HI Mianz)
Susan Schadmand (FZ Juelich)

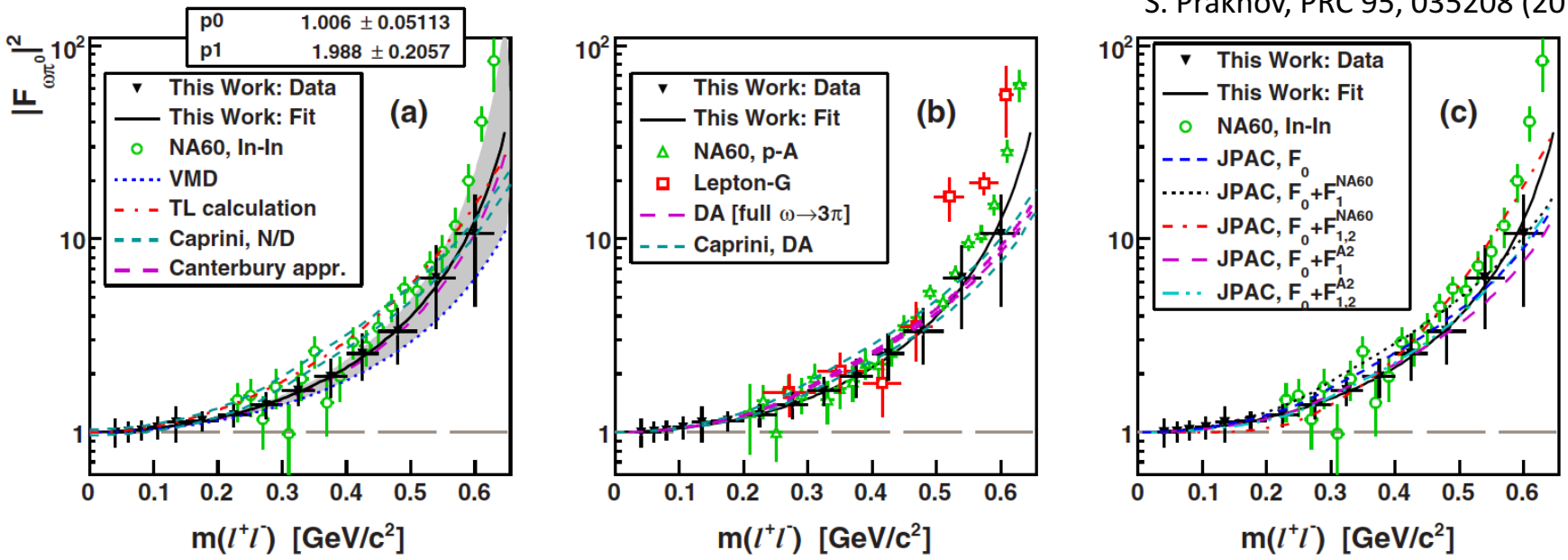
An update on omega->pi0e+e- analysis from g12

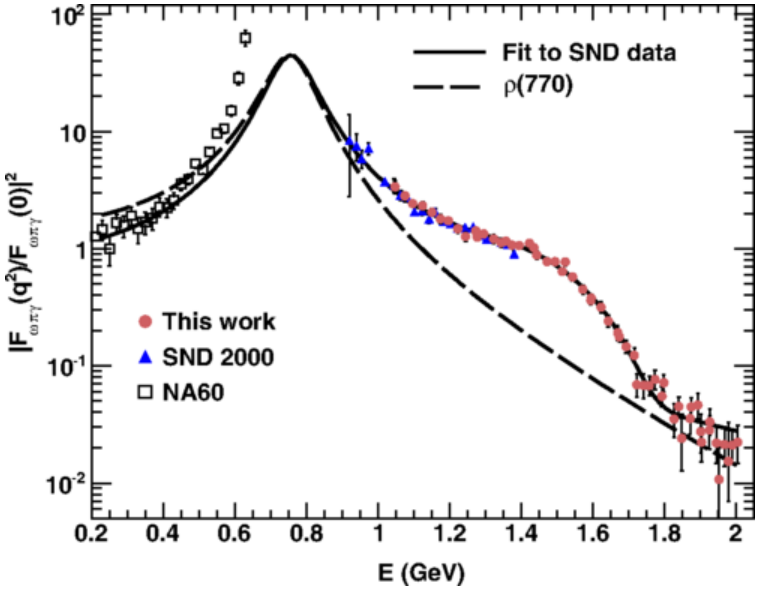
hadron spectroscopy session
CLAS collaboration meeting
March 2019 at Jefferson Lab

Susan Schadmand, IKP

transition form factor of the ω meson

S. Prakhov, PRC 95, 035208 (2017)



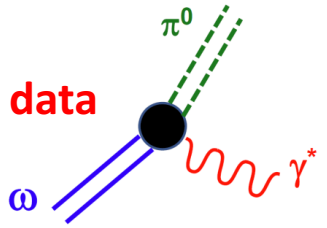


M. N. Achasov *et al.*, Phys. Rev. D 94, (2016) 112001

SND $e^+e^- \to \omega\pi^0$ cross section

fitted vector meson dominance model (three ρ-like states)

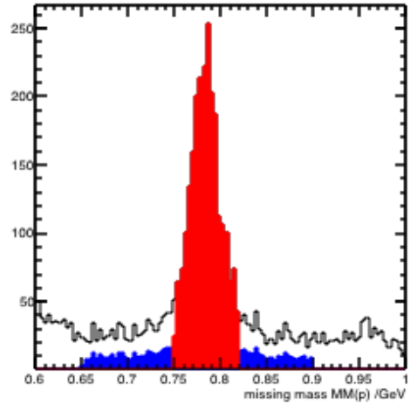
conflict with decay data

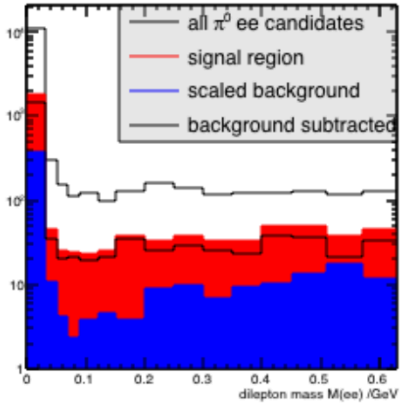


preliminary look at ω-π⁰ transition form factor

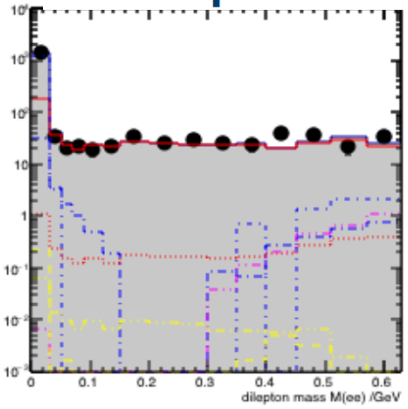
$$\gamma p \rightarrow p\omega$$

smooth background subtraction

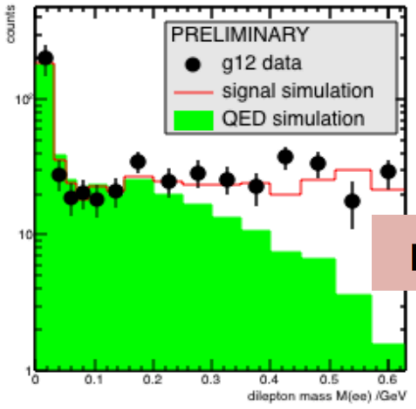




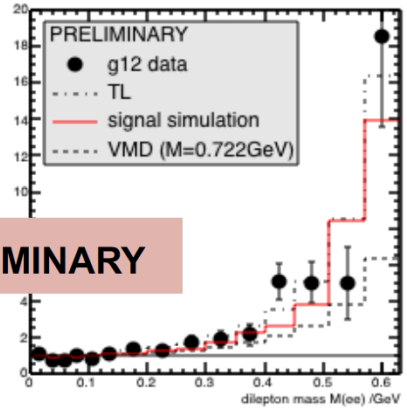
in-peak background



in-peak and smooth background subtracted



data / QED simulation



PRELIMINARY

simulations for in-peak background reveal:

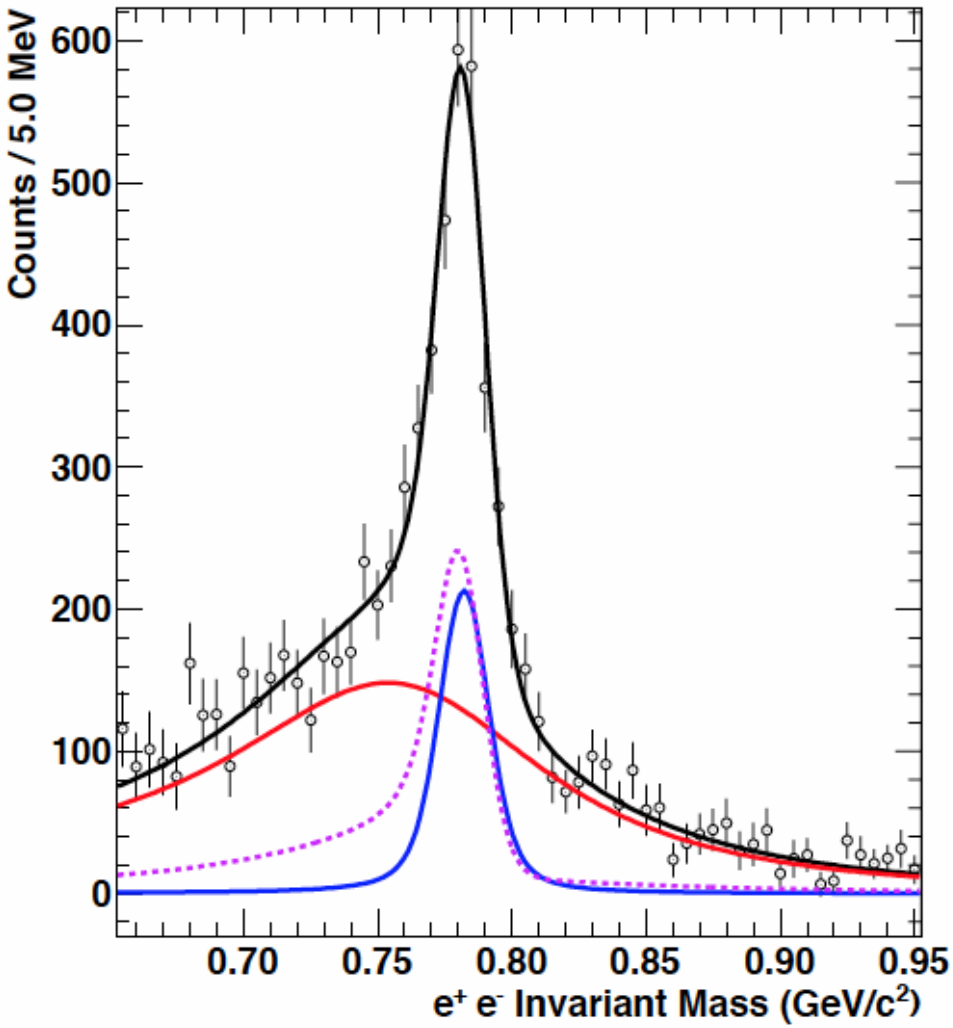
- **external conversion** at small masses
- **combinatorics** at large masses
- influence of rho/omega dilepton decay

- effect of (strict) cut-based analysis
- **new analysis**
  - **statistics**
  - **combinatorics**

preliminary analysis:
so far, consistent with A2 result (and 'extended' VMD)

C. Terschlüsen and S. Leupold, Phys. Lett. B 691, 191 (2010)

ρ -ω interference



PoS Hadron2013 (2013) 176
JLAB-PHY-13-1839

based on same data
CLAS g12 experiment

targeted channel
γ + p → p + ee (in the ρ regime**)**

event selection via

- PID dilepton
- missing mass MM(ee)=M(p)

interference
causes low-mass tail

and this still has to be published -
.....!!! :D

All reconstructed data resides in BOS files on the tape-silo at JLab under the directory:

/mss/clas/g12/production/pass1/bos

which contains the following subdirectories or "categories" used for event-sorting:

1-1ckaon1ctrk Events which have at least 2 charged tracks, one of which is a "possible kaon." A possible
kaon is either a track that the PART bank says is a kaon, or a high-momentum charged pion (> 2.0 GeV),
or a really high momentum proton (> 3.0 GeV). The idea of this selection is to leave no kaon behind.

2-2pos1neg_not_1ckaon1ctrk Two-positive and one-negative (+ + −) inclusive events which are not included
in 1-1ckaon1ctrk. So, for example, if you wanted all (+ + −) events you would have to use both this category and 1-1ckaon1ctrk.

3-2ctrk_not_2pos1neg_1ckaon1ctrk Events with 2 or more charged tracks which do not qualify for either
1-1ckaon1ctrk or 2-2pos1neg_not_1ckaon1ctrk.

4-not_2ctrk_2pos1neg_1ckaon1ctrk Physics events that do not fit into categories 1, 2, or 3.

5-other Non-physics events which may include scalers and such.

6-1lepton Redundant set of all events with a single "possible lepton" according to the ClasParticle::isMaybeLepton() method in the ClasEvent analysis suite.

7-4ctrk Redundant set of all four-charged track events.

8-ppbar Redundant set of all proton, anti-proton events according to the PART bank.

Note that the first five of these categories are mutually exclusive and complete.

currently

- the available trees:
  - g7leptons
  (based on CLASnote-2006-???)
  - 1 and only one p, e-, e+

- want for new trees:
  - full multiplicities
  - charged particles
  with info on g7lepton parameters

Application	Description	Cut
Lepton Identification	EC Energy and P	Eq. 2
	angular matching and NPE in CC	> 2.5
	ECin >45MeV Min Ionization Energy	> 45 MeV
	not here Lepton Momentum	> 500 MeV
Lepton Pair Identification	Radial Vertex Position	$r < 2$ cm
	Z-Vertex Position	$\|dz\| < 3$ cm
	Vertex Timing	$\|dt\| < 1$ ns

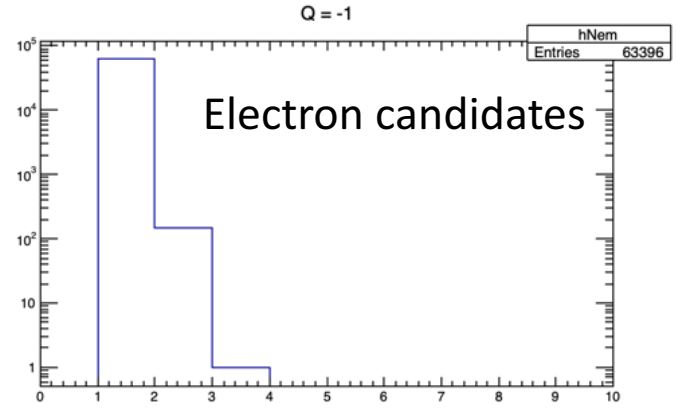
Table 4: Summary of the analysis cuts.

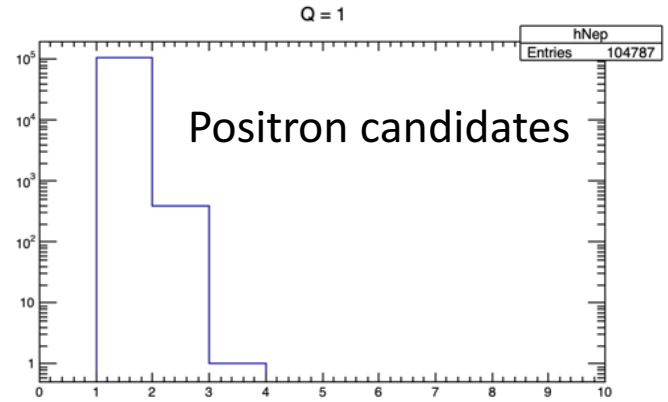
- **have now from clasevent (pass1 presorts)**
  - **MaybeLeptons (EC or CC or TOF)**
  - **pi+, pi- included in the array**

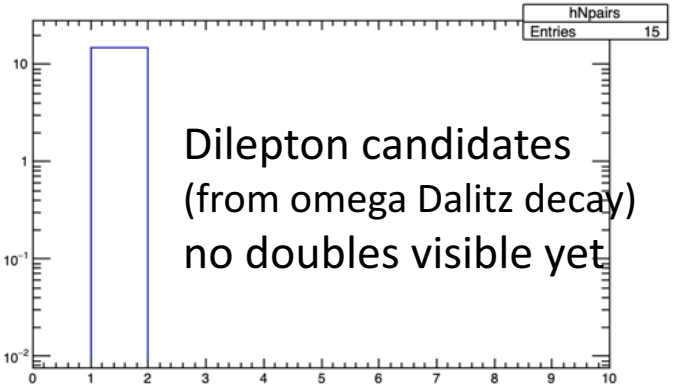
- check on:
  - g7lepton pair multiplicity
  - lepton pair multiplicity for varied conditions

- **goal:**
  - **improved statistics (doubtful)**
  - **systematic study of lepton cuts**
  - **study combinatorics**

first glimpse multiplicities



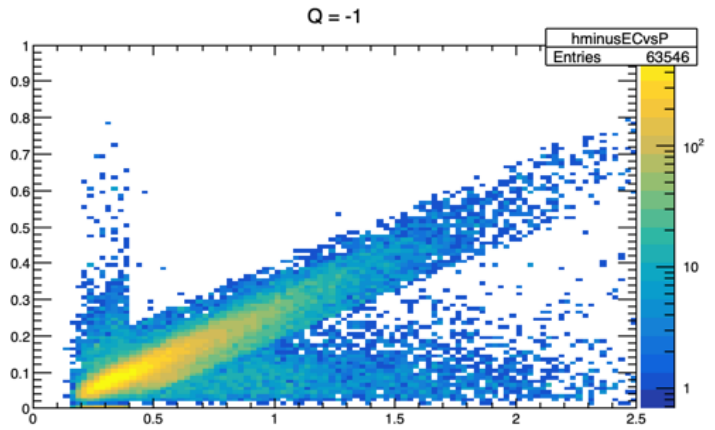


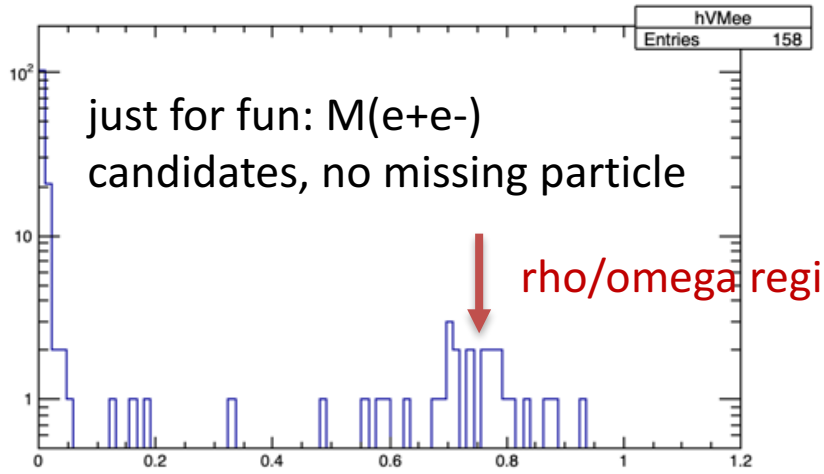


relation between EC deposited energy and DC momentum

$$E_{EC} = (0.23 + 0.071P - 0.032P^2)P \quad \text{if} \quad P < 1.0\ GeV/c$$

$$= 0.272P \quad \text{if} \quad P \geq 1.0\ GeV/c,$$





using maybeleptons, pass1 presorts 1-3,
runs 57315 - 57317
(runs go from 56363 to 57317)