



# Development of a RICH Detector for the RHIC PHENIX

Presented by  
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for the  
PHENIX RICH Group  
at a  
JPS Meeting in Chiba  
on  
March 31, 1998



## PHENIX RICH Group

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  - ORNL
  - BNL



# Presentation Outline

## Introduction

- RHIC
- PHENIX

## PHENIX RICH Overview

## Project Status Highlights

- Gas Vessel
- PMT Supermodule
- Assembly
- Simulation / Software Development

## Plan & Schedule

## Concluding Remarks



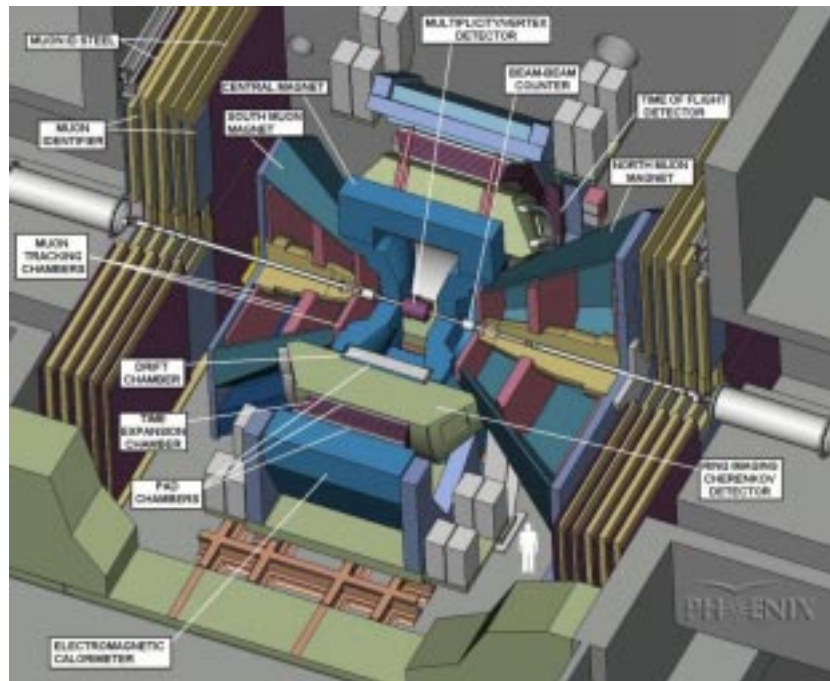
## Introduction... RHIC



Layout  
of  
the  
RHIC  
Accelerator  
Complex  
at  
BNL

- Heavy Ion (up to  $^{197}\text{Au}$ ) Collider  
at up to 100 A GeV
- Polarized Proton (up to 450 GeV)  
also Available
- Programs Starting in 1999

# Introduction... RHIC... PHENIX

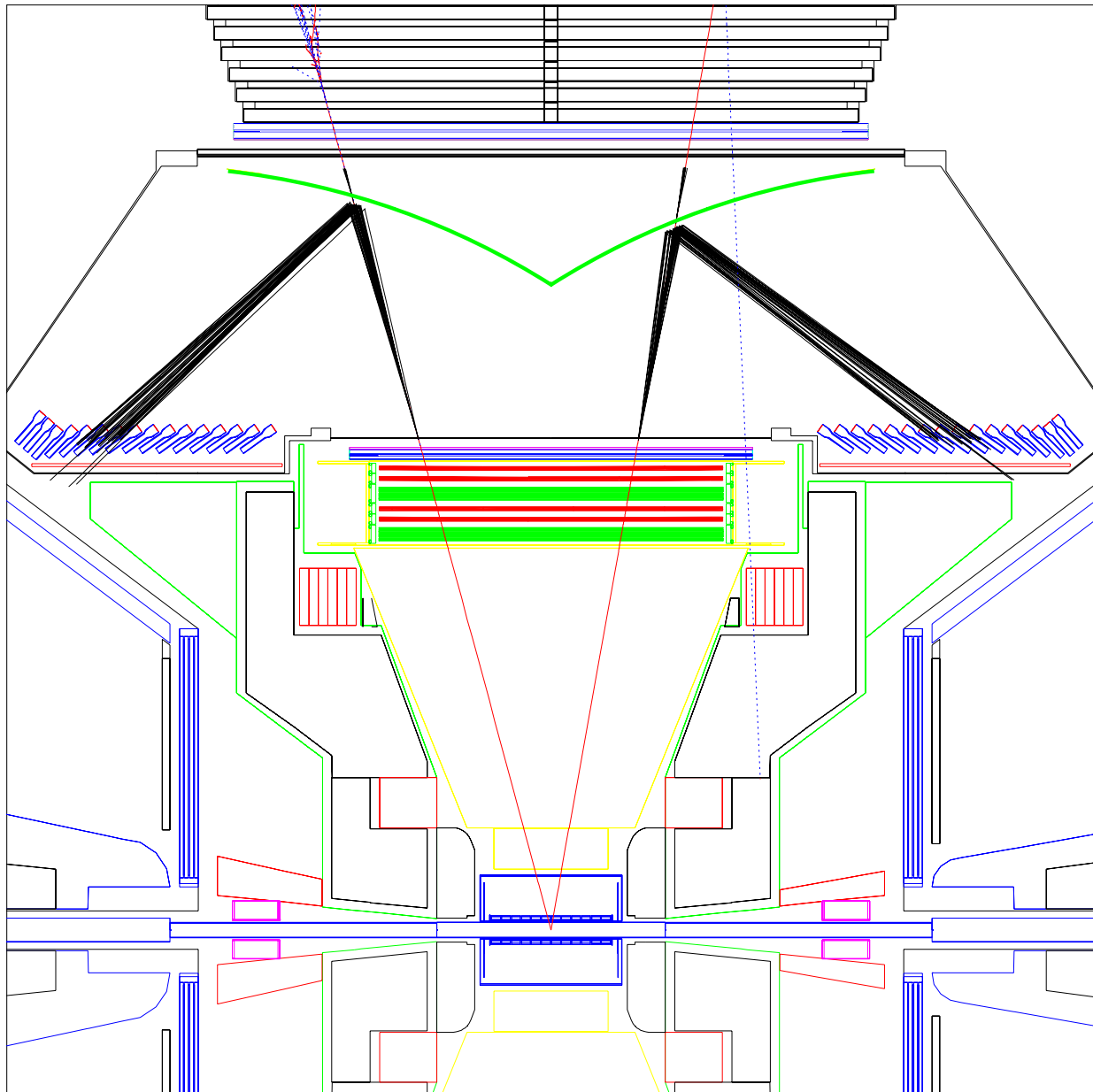


Schematic  
Layout  
of  
the  
PHENIX  
Experiment  
at  
RHIC

Current  
Status  
of  
the  
PHENIX  
Experimental  
Hall



# PHENIX RICH Overview



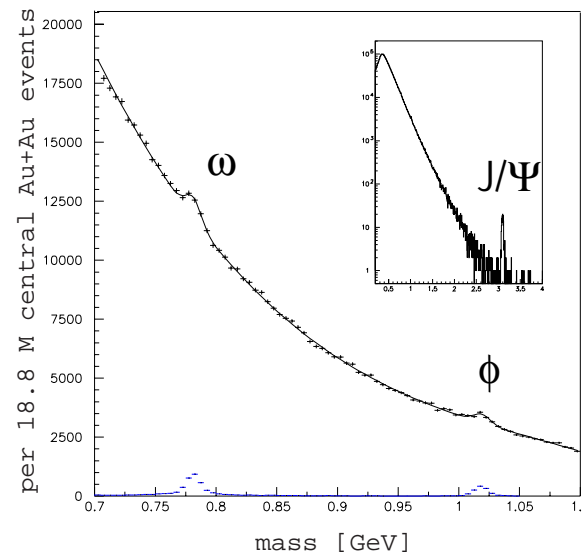
Schematics of the PHENIX RICH Detector



## PHENIX RICH Overview (cont'd)

### Physics Purpose

- **e-ID** for  
Di-Electron  
Measurement  
etc.



### Performance Goal

- Single Hadron Rejection at  $10^4$  Level  
with Electron Efficiency  $\sim 100\%$

### Features

- Full Acceptance Coverage  
for PHENIX Central Arms  
( $|y| < 0.35$ ,  $\delta\phi = 90$  degrees x 2)
- **Gas Radiator** ( $C_2H_6$  ;  $\gamma_{th} \sim 25$ )
- **PMT Array Readout** (5,120 Channels)  
Pixel Size  $\sim 1$  degree x 1 degree
- $n_0 > 100$  / cm ;  $\langle n_{p.e.} \rangle \sim 20$



## Status Highlight... Gas Vessel

2 Arms ; 40 m<sup>3</sup> Each

Design & Construction by FSU

First Vessel Delivered to BNL

First  
Gas  
Vessel  
Delivered  
to  
BNL  
in  
December  
1997





## Status Highlight... PMT Supermodule



PMT  
Supermodules  
Ready  
to  
be  
Installed

Mechanical Design

by SUNY Stony Brook & BNL

PMT's QA Tested at CNS, U.Tokyo

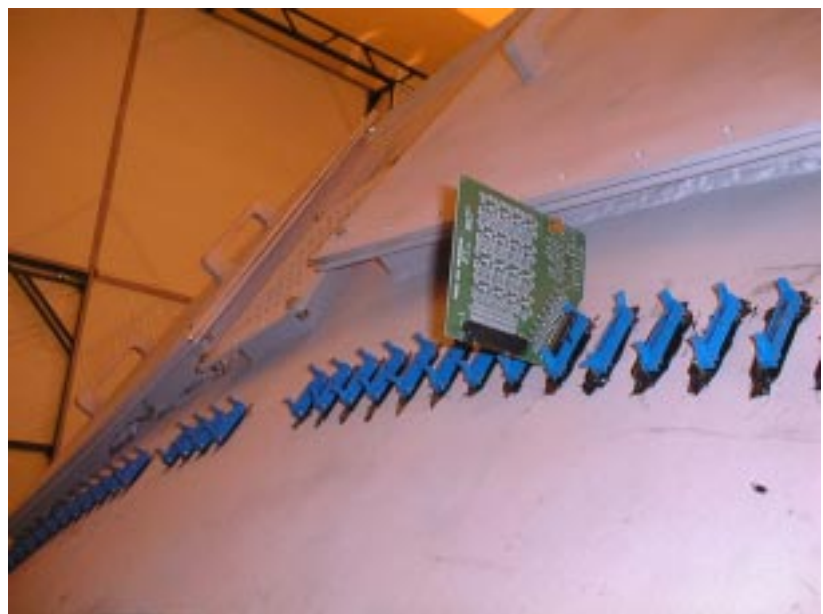
**80 Supermodules for the First Vessel  
Completed** at SUNY Stony Brook

# Status Highlight... Assembly Started



PMT  
Supermodules  
Pre-Installed  
in  
the  
Gas  
Vessel  
at  
BNL

a  
Pre-Amplifier  
Card  
Attached  
to  
the  
Vessel





# Simulation / Software Development

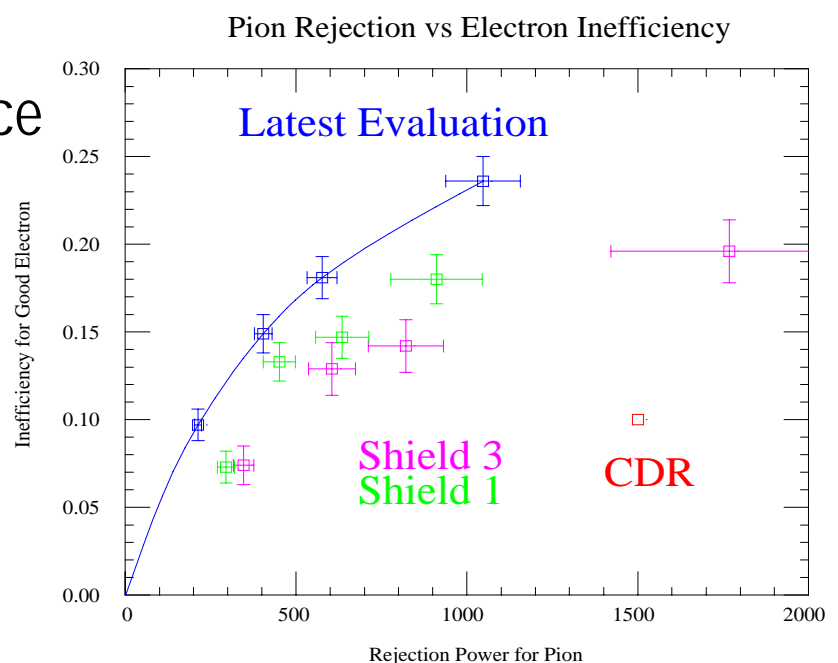
## Full GEANT Simulation & Analysis Chain

### Work Completed

- Optics Optimization
- Choice of Radiator Gas
- Stand-Alone

Performance  
Evaluation

- Background  
/ Shielding  
Studies



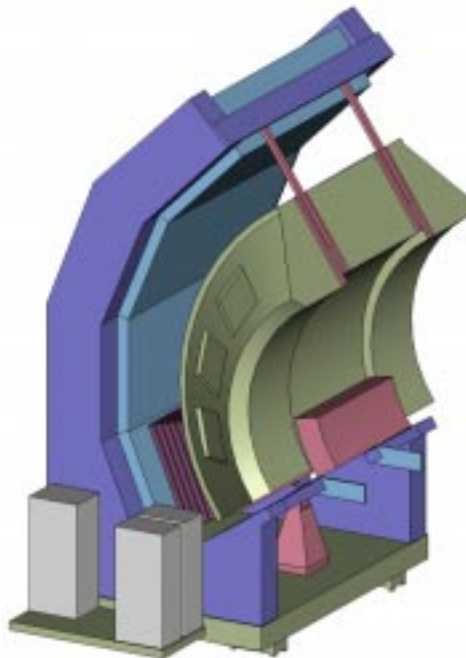
### Work to be Done

- Calibration Studies
- Tracking / Trigger Studies
- Global Performance Evaluation



## Plan & Schedule

1998	3- 4	Loading PMT Supermodules
	5- 6	Mirror Installation
	6	Cabling
	7	Window Installation
	8	Final Tests - <b>ARM 1 READY</b>
1999	1- 7	PHENIX Engineering Run



2 **ARM 2 READY**  
10- **FIRST PHYSICS RUN**



## Concluding Remarks

First Article of RICH Detector  
for the RHIC PHENIX Experiment  
is under Construction at Full Speed

The First Arm will be Completed in 1998;  
The First PHENIX Run Coming in 1999

Readout Electronics is  
under Development in Japan (+ ORNL)  
(cf. Talk by K.Oyama)

Visit  
<http://www.rhic.bnl.gov/phenix/>  
<http://www.phenix-j.rhic.bnl.gov/rich/>  
for More Information if Interested