

Status of RHIC Vacuum Systems

Dec 12, 2005

Modification

Sector 4 RF (AC, SC, CC,...)

Stochastic Cooling @ #4 & #12

IR6 (STAR-FMS & pump) + ...

IR10 ED & TWC

IPMs, RPs @ BO2

Anti-grazing rings at BI5

Upgrade

NEG (430m installed, ~100m in 06')

IR10 (remove Be pipes, install NEG ones)

Polarimeters

Cold Bore

Other works

VB # 8Y Leak Repair (not successful)

Bleed-Ups for BPM repair

Insulating Vacuum

Status and 2006

SCK in-situ bake - this week?

STAR - waiting for decision

Work list for long shut down

RF Related Work in Sector #4

Relocation of SC: completed

Two SC, IPs, GVs, beam pipes, vacuum I&C Platform, crane, plumbing, cabling,

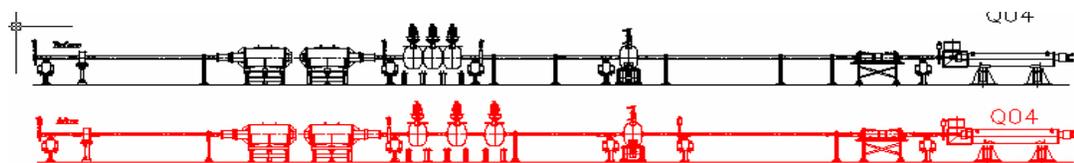
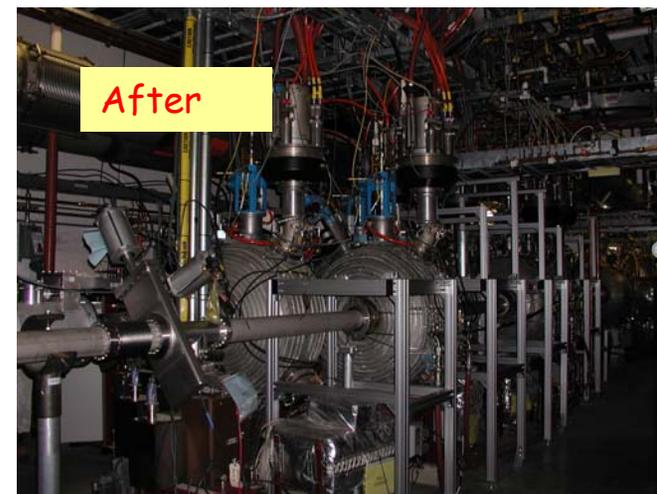
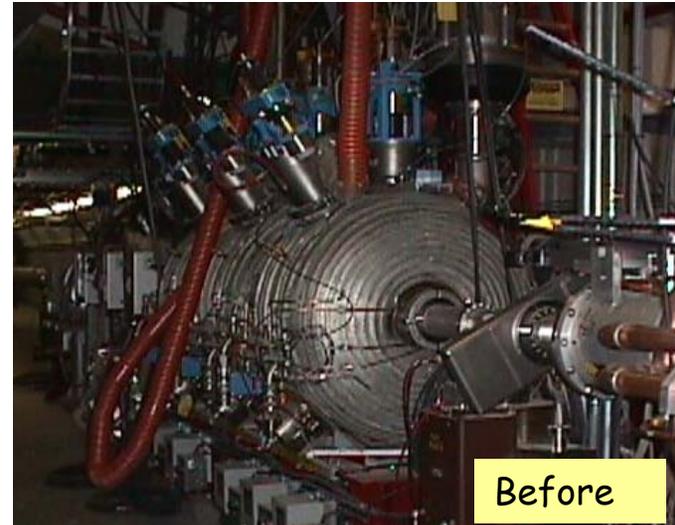
AC Tuner Repair/upgrade

SC Dampers Air Cooling Upgrade

CC PA Window Upgrade/testing: *on going*

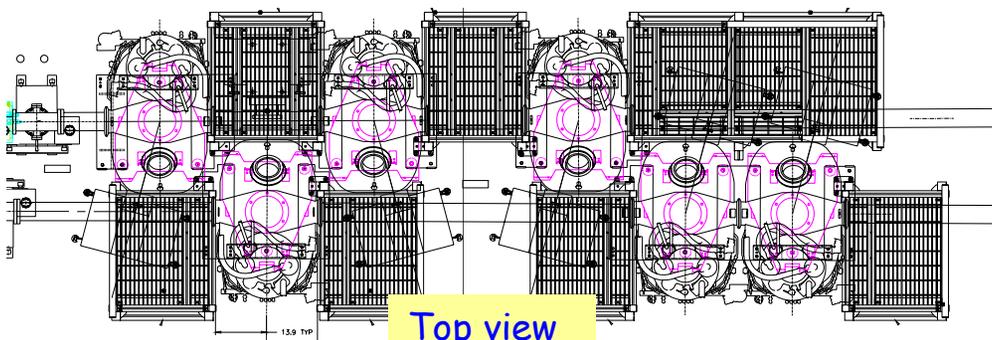
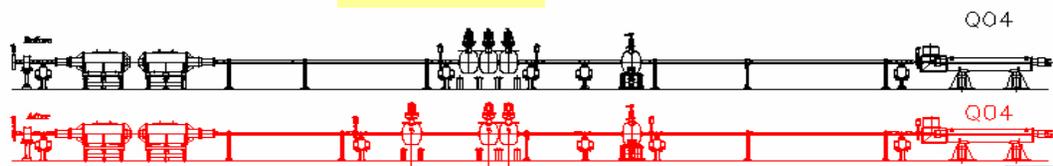
New stochastic cooling kickers: to be baked this week

Relocated cooling pickup from YI11 to YO12

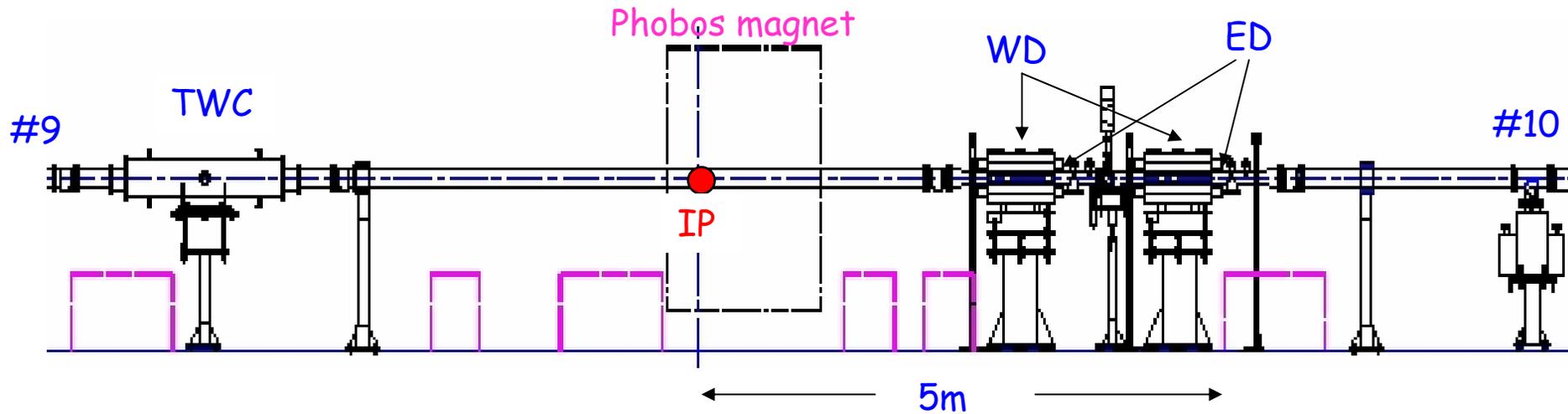


Side view

SECTOR 4



New IR10 Layout



Removed Phobos detectors and **three 4m Be** beam pipes

Installed CERN traveling wave schottky pickup (**TWC**) (#9 side)

Two CERN electron detectors (**ED**) and two warm dipoles (**WD**) (#10 side)

8.5m **NEG** coated beam pipes

In-situ baked IR10 in Nov \Rightarrow **low 10^{-11} Torr**



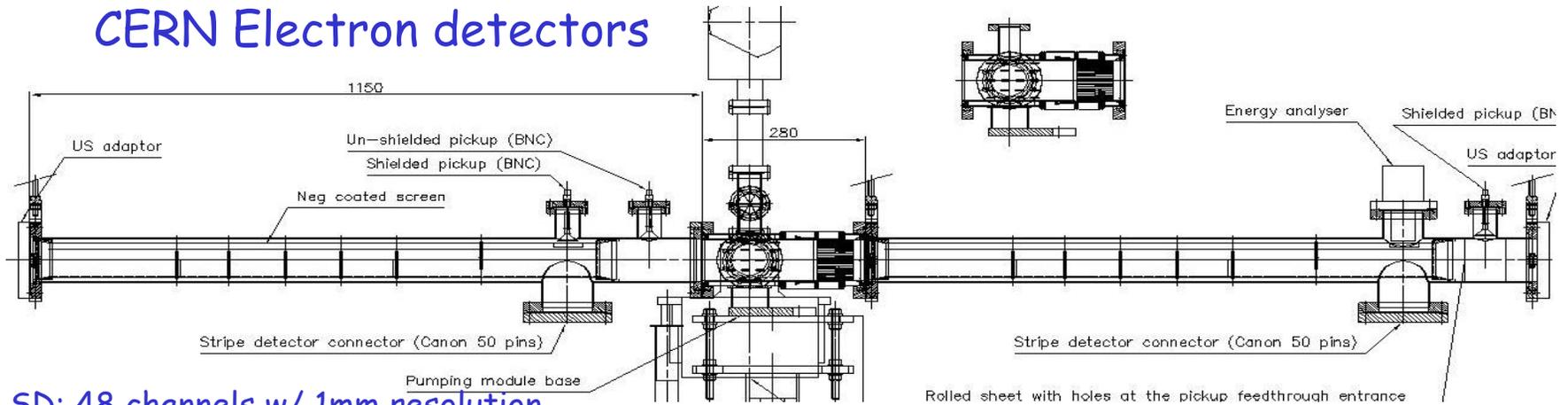
TWC:

From CERN SPS

In-situ baked to 150 C

after repaired a few leaks

CERN Electron detectors



SD: 48 channels w/ 1mm resolution
 shields w/ NEG coating and 7% opening
 pickup for turn-to-turn measurement

RFD: up to 300 eV

RGA & CCG

Two warm dipoles (from yo5)

To enhance the electron signals

Gap: 24" L x 6" W x 5" H

B: < 500 Gauss

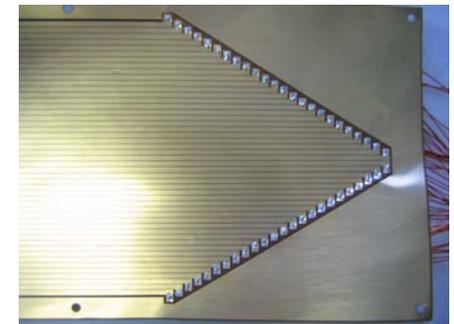
RFD/Energy analyzer



Un-shielded pickup



Stripe detectors (SD)



Polarimeter Vacuum Upgrade

During O5 run - long pump down time after target changes

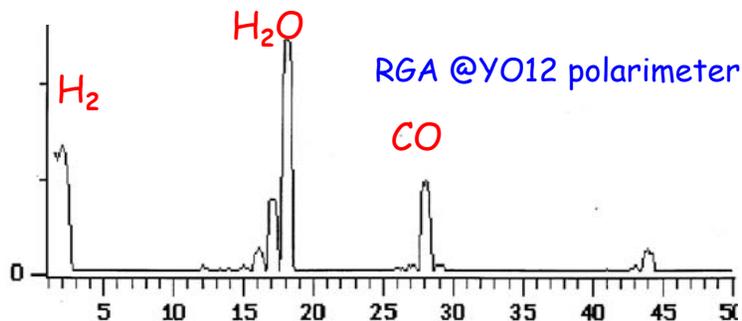
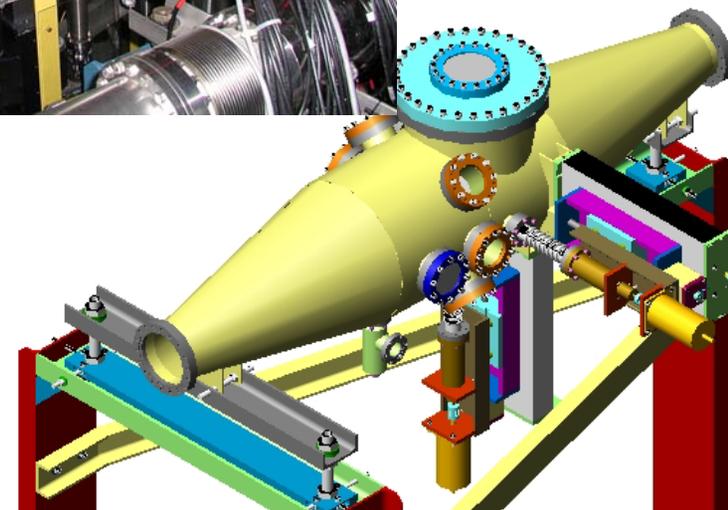
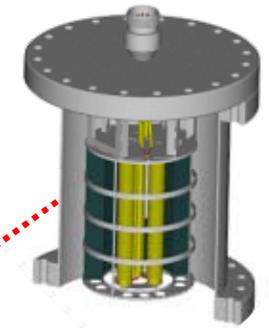
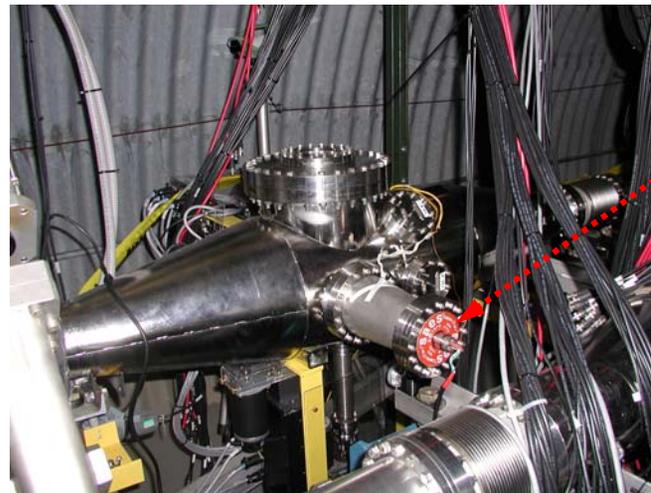
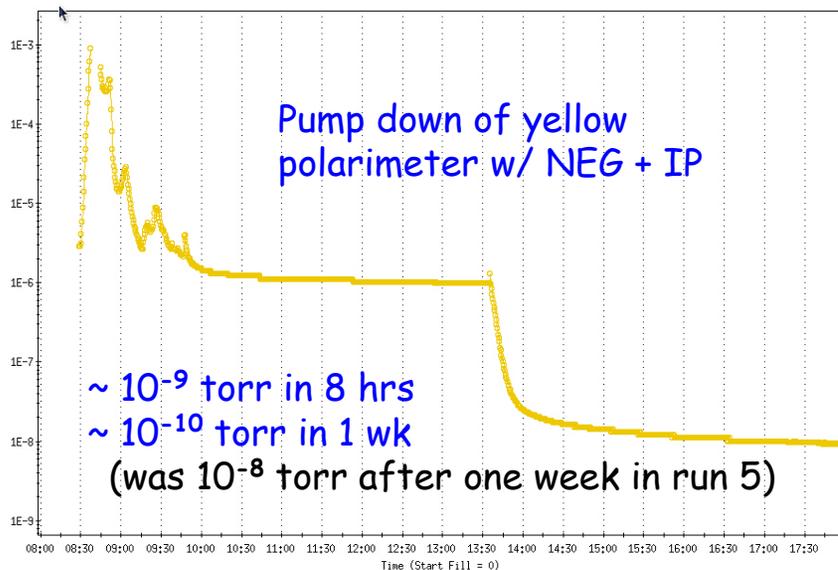
Goal: Reduce outgassing, faster pump down

Identified high outgassing components: Peek insulators (x 5)

Added 500 l/s NEG cartridge pump (x 3)

Expected gain (24 hrs after pump down): ≥ 10

NEG Cartridge



Cold Bore Upgrade

Observed C-B pressure rise during high I, 110-bunch Au, Cu and p⁺ ramps

e⁻ and M⁺ induced desorption

No active pumping of the C-B sections in the last four summers/warm-ups!

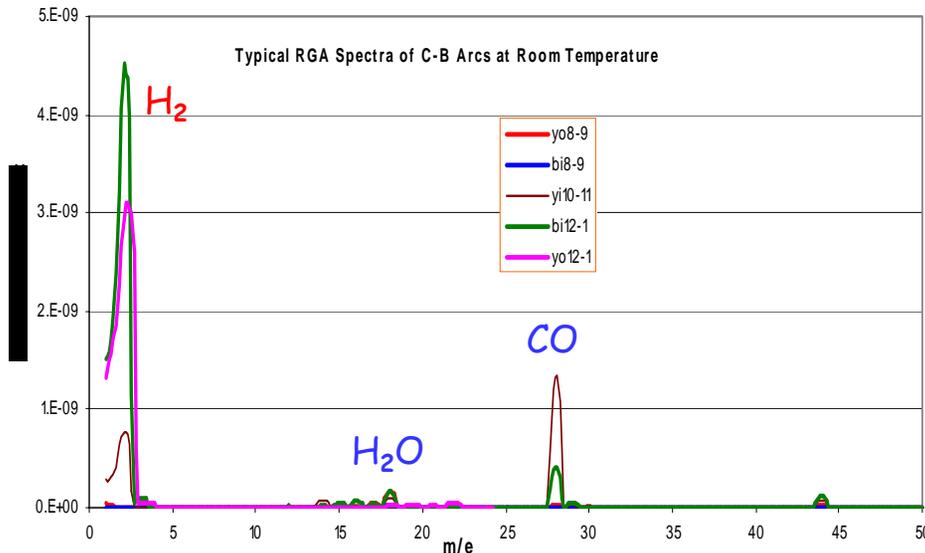
Pressure was from 10⁻² to 10⁻¹ Torr (> tens monolayers)

Sampled 5 arcs and 5 triplets with RGA

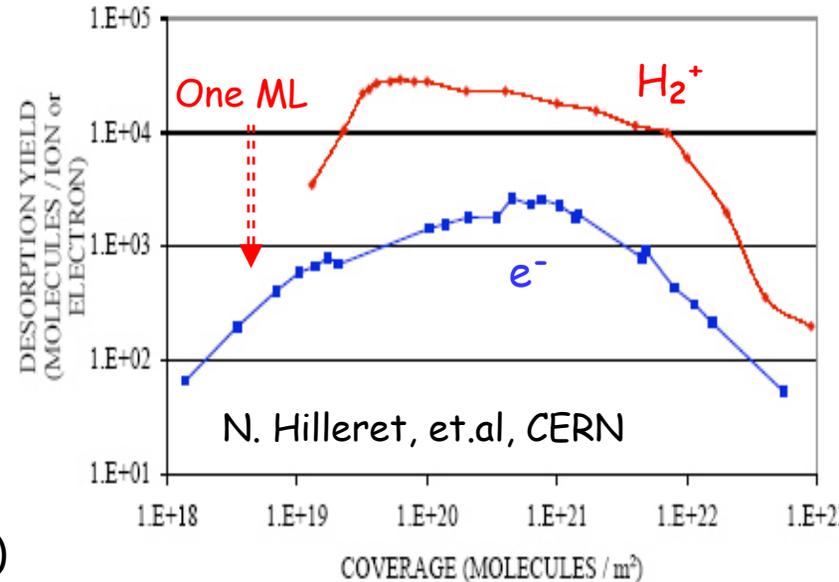
H₂ (90 - 14%) No He

Sections with highest pressure rises

have highest H₂ (condensed H₂ has high η)



ION INDUCED DESORPTION YIELD FOR CONDENSED HYDROGEN BOMBARDED BY H₂⁺ IONS OR ELECTRONS



Goal of Upgrade:

Pressure of < 10⁻⁶ Torr before cooldown to reduce the physi-sorbed gas to sub-monolayers after cool down

Cold Bore Upgrade

Installed: Four ion pumps per long arcs (every 120m)
One ion pump per triplet and inj. section
Six fixed turbopumps to pump the 12 arcs
Portable turbopumps to pump the 28 triplets and inj. sections

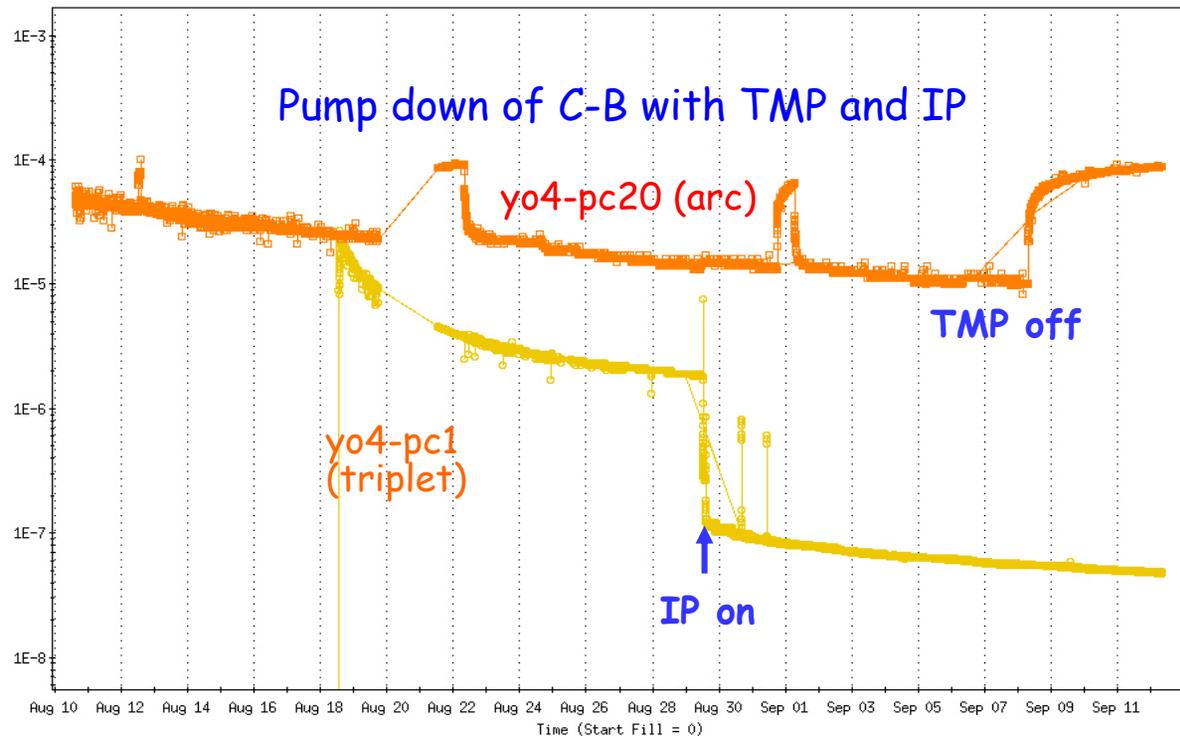
Pumped by turbopumps during this summer

Arcs: ~2 months (to $\sim 10^{-5}$ Torr) before turning on ion pumps

Triplets: ~2 weeks (to $\sim 10^{-6}$ Torr) before turning on ion pump

New IPCs, cabling, termination, control interface at six service buildings

All operational since early Oct
with remote control/logging
Triplets are at 10^{-8} Torr
Arcs are at $< 10^{-6}$ Torr



Vacuum Status: Almost ready for 06' run

SCK bakeouts - in preparation for this weekend

STAR vacuum - waiting for decision

All insulating vacuum turbopumps to be re-started

Proposed work list for long 06' shutdown

Large Effort

Injectors

BtA foil chamber and bakeout

AGS IPC upgrade for E18 (or A10)

RHIC - Beam

Dump kicker leak repair @ yo9

YO1 RP removal + PLL rotation + IPM

RP installation at yo5 and bo6

BBLR installation at yo5 and yi6

NEG pipes @ bi1, yo5, bo6, yi7, yo9, bo10

RF work and development

STAR beam pipe modification

Blue SCK and pickup?

C-B roughing manifolds

RHIC - Insulating

#8Y VB leak locating and repair

#12-1 blue arc Q6 line repair

#10 VB coaxial lead modification

Medium Effort

Injectors

Rebuild Linac ion pumps

Rebuild AGS ion pumps

Clean storage of AGS spare chambers

C5, E15 IPM upgrade and ion pump replacement

Booster portable TMP repair

AGS TMP oil change

Booster spare F6 septum

RHIC

RHIC blower repair

RHIC portable TMP repair

RHIC Cryostat TMP maintenance

Upgrade valve box pumping flex lines

Bakeout cart modification w/ RGA

Vacuum Lab

Move from 820 to 905 (coating, furnace,...)

Setup test chambers/facilities in 911 vac lab