User Controlled Access at NSRL

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BROOKHAVEN NATIONAL LABORATORY
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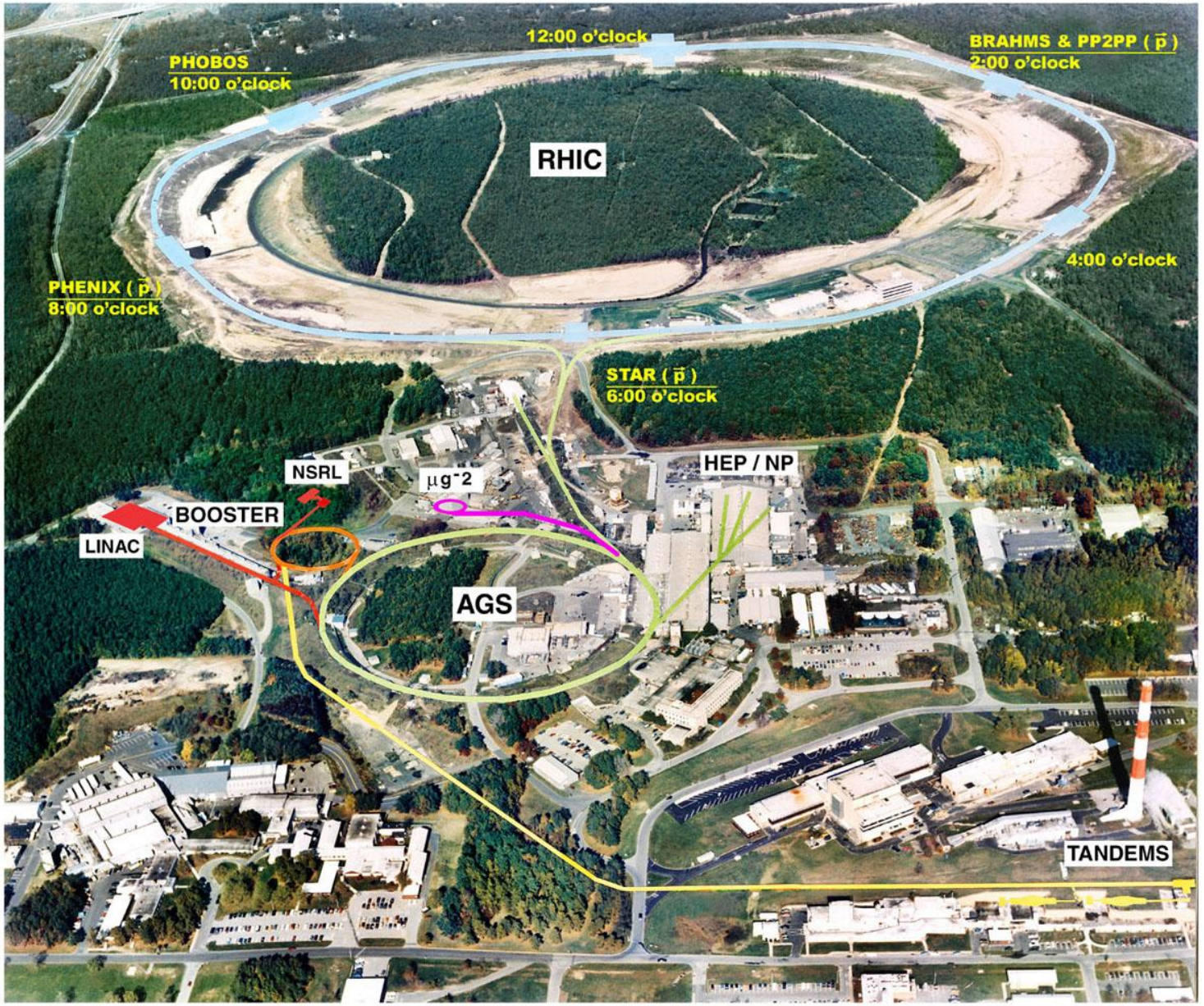
Summary of the Presentation

- The Accelerator Complex
- NASA Space Radiation Laboratory
- Operator monitored access to high radiation area
- Computer monitored access to high radiation area
- User Controlled Access system elements.
- User Controlled Access Sequence
- Conclusions

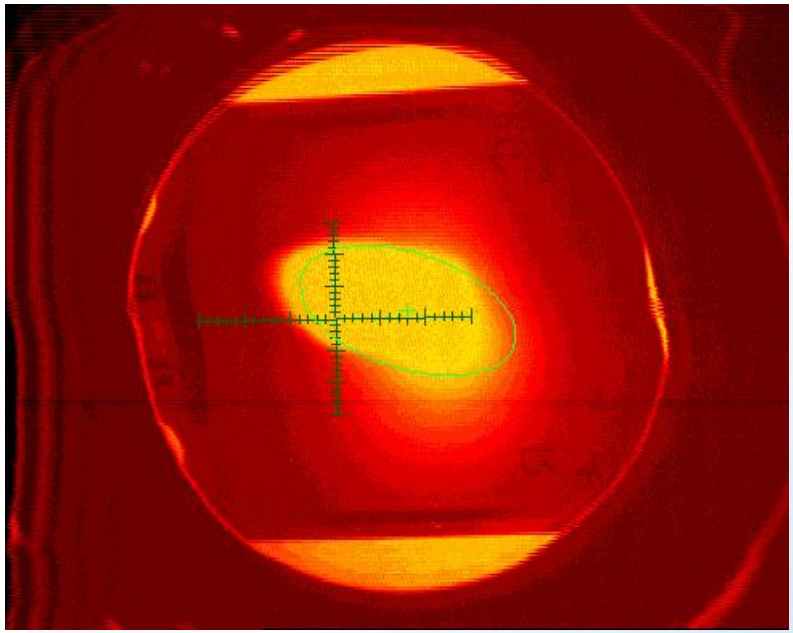

12:00 o'clock
BRAHMS & PP2PP (p⃗)
2:00 o'clock
PHOBOS
10:00 o'clock
RHIC
4:00 o'clock
PHENIX (p⃗)
8:00 o'clock
STAR (p⃗)
6:00 o'clock
NSRL
μg-2
HEP / NP
BOOSTER
LINAC
AGS
TANDEMS

NASA Space Radiation Laboratory

- Radiobiology facility used to simulate the radiation environment in outer space.
- Funded by NASA to study risks to Humans during a manned mission to Mars.

NASA Space Radiation Laboratory

- Exposes Biological Systems (ranging from cells to complex organisms) to ions delivered from the Booster synchrotron.
  - Ions ranging from ^{1}H (50-2000 MeV/n) to ^{56}Fe (100-1000 MeV/n)
- In operation since 2003 (~24 weeks/year).



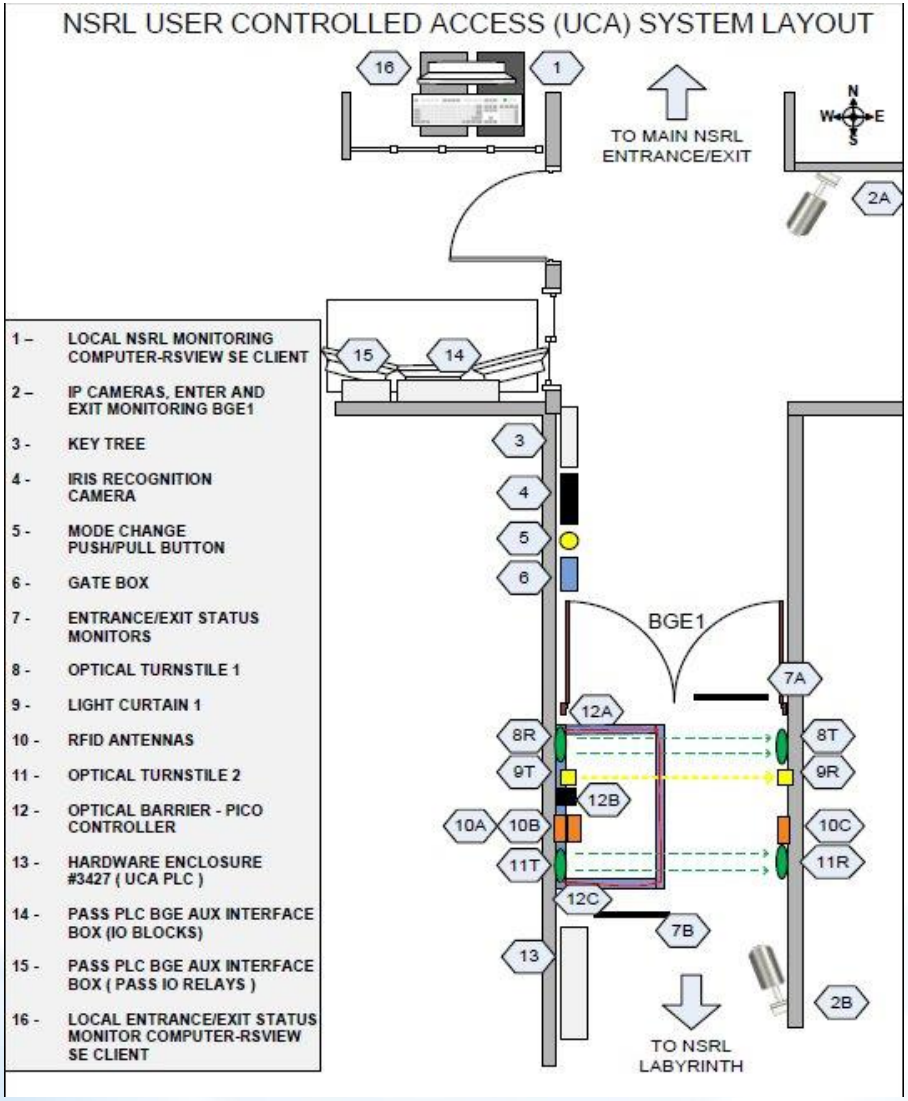
Operator Controlled Access

- NSRL >5 access per hour
- @ BNL Strict rules for access to high radiation areas.
- Operator turns off source of radiation.
- Operator/biometric scanner identifies entrant
- Operator performs in/out body count by logging entry/exit
- Operator turns on source of radiation.

User Controlled Access

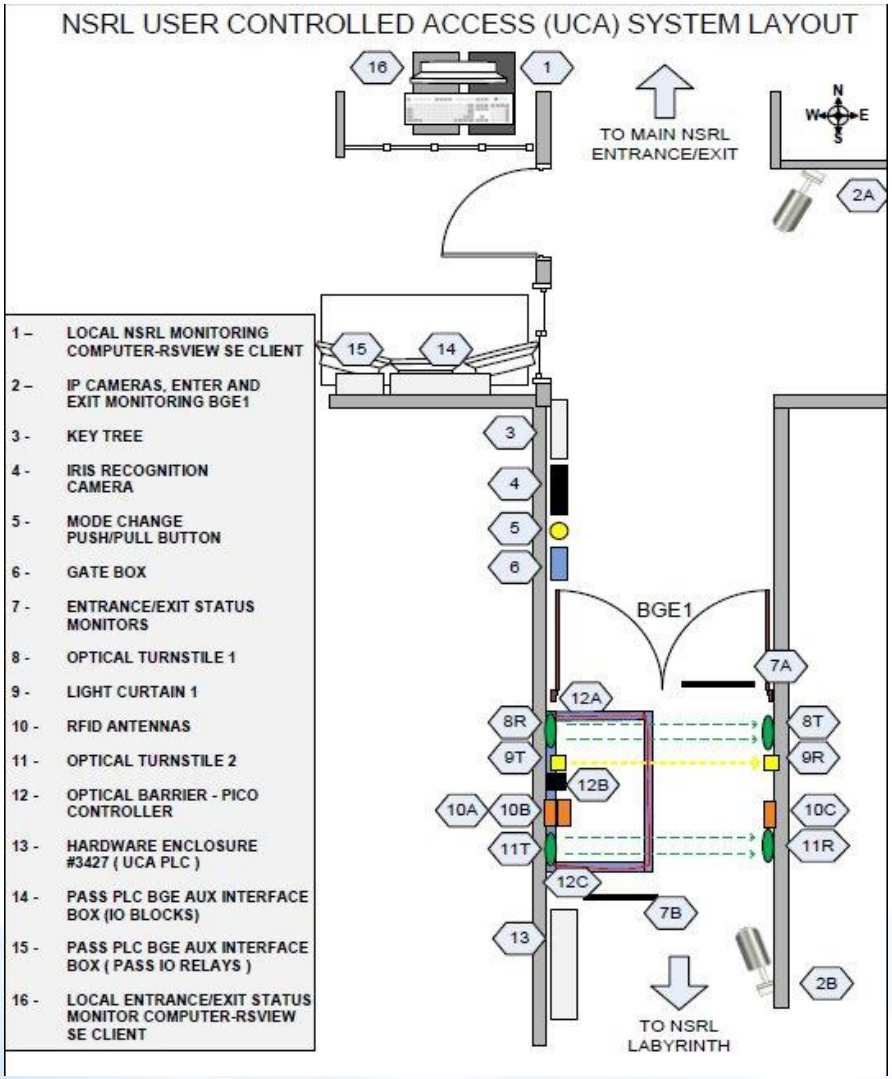
- Programmable Logic Controller driven
- Interfaced with “safety system”
- Counts entries & exits
- Logs identity of entrants
- Human turns off source of radiation

UCA "Field" Components



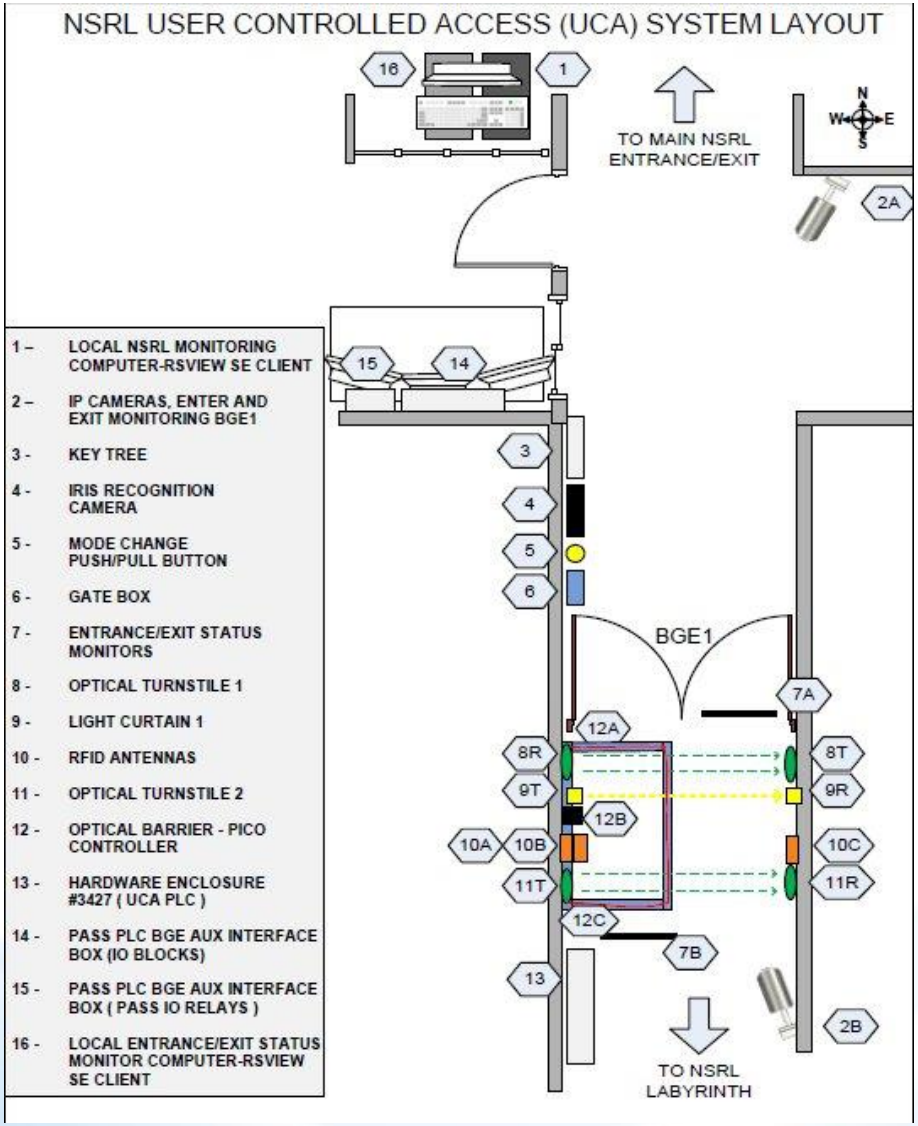
- Key Tree
  - Captured key & RfID
- Iris Recognition Camera
  - Identifies trained user and releases captured key
- Mode Change Button
  - Disables radiation source
- Entry/Exit Monitor (2)
  - Go/Green No-Go/Red

UCA "Field" Components



- Door
- Optical Turnstiles (2)
  - Body count
  - Ensures serial entry
- Light Curtain
  - Enables RfID identifier
  - Guards against malicious turnstile use
- RfID Antennae
  - Determines entrant carries captured key (radiation source cannot be enabled)

UCA "Field" Components



- Barrier in place
  - Barrier ensures serial entries.
  - Barrier "In place" verified by the system
- UCA PLC
  - Determines actions follow pre-programmed sequence
- PASS PLC
  - Drives safety system
  - Gets input from UCA PLC

UCA Entry Sequence (1)

- Prerequisites to enter
  - Enclosure is “swept” free of personnel
  - All keys are captured in the Key Tree & Key Tree is “ready”
  - UCA PLC informed that radiation source is disabled (mode = Controlled Access)
- Entrant’s eye is read by Iris identification camera
- Validated entrant is instructed to remove captured key
- PASS PLC commands door motor open activation
- PASS PLC told by UCA PLC specific key is missing
  - Another entrant is permitted to scan iris and get a key
- Monitor gives Go/Green indication and entrant passes through doorway

UCA Entry Sequence (2)

- Entrant breaks light beams of first Optical Turnstile
  - UCA PLC “Begin Entry Process”
  - UCA PLC told to start 10 second transit timer
  - UCA PLC increases Turnstile_1 count by +1
  - UCA PLC alerts Turnstile_2
  - UCA PLC activates RfID reader
  - Monitor gives No-Go/Red indication (system in use)
- Entrant breaks light beams of Light Curtain
  - RfID reader identifies Token
- Light Curtain beams unbroken as entrant passes
  - RfID sends UCA PLC token/key number
- UCA PLC matches token/key with (iris) logged entrant
- Entrant breaks light beams of second Optical Turnstile

UCA Entry Sequence (3)

- Entrant passes second Optical Turnstile
  - UCA PLC End “Entry Process”
  - UCA PLC recognizes “Target Area NOT Empty”
- UCA PLC disables RfID reader
- Monitors give Go/Green for entry or exit

Conclusions

- UCA first used September – November 2009
  - Humans observe error messages & watch for unsafe failures (beam on with entrant in the target room)
  - Bugs worked out – good experience
  - NO Unsafe Failures
- UCA first stand alone operation April – June 2010
- Well received by users & MCR operators