

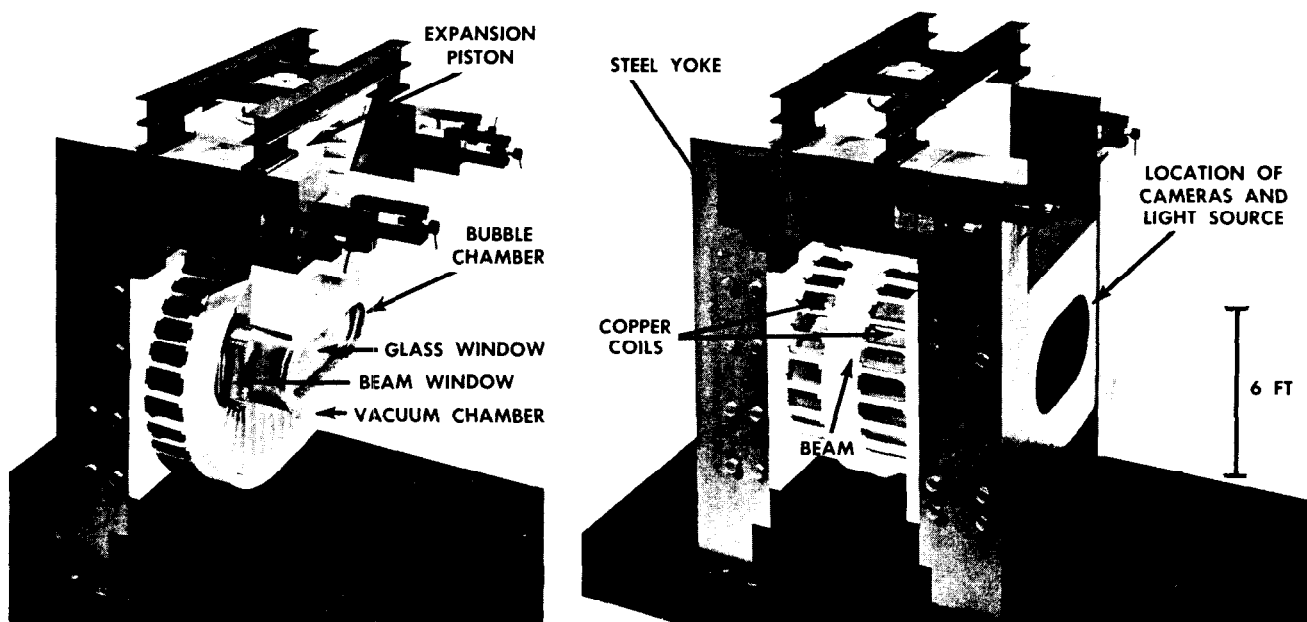
the Bulletin Board

THE BULLETIN BOARD

Published by the BNL Personnel Office

JANUARY 17, 1961

THE 80 INCH BUBBLE CHAMBER



BNL NEWS FLASHES

THE BOARD OF TRUSTEES of Associated Universities, Inc., will meet at Brookhaven this week, January 19 and 20. SCIENCE WRITERS who are fellows at the Advanced Science Writing Program at the Columbia University Graduate School of Journalism will visit the Laboratory on Monday and Tuesday, January 23 and 24. The nine writers and Professor John Foster, director of the program, will talk with members of the staffs of various scientific departments.

CHES NEWS

The final playoff for the BNL chess championship was held on January 9 between James Cummings and Lauri Miller. Miller emerged the victor and cups will be presented to both Miller and Cummings by BERA. At present both cups are on display at the Recreation Building.

MOVIE SCHEDULE

February 6	RICHARD III
March 6	MY UNCLE
April 3	THE 400 BLOWS
May 8	TIME OF DESIRE
June 5	THE SEVENTH SEAL

Two photographs of a model of the 80" liquid hydrogen bubble chamber under construction at BNL. Photo at left shows vacuum tank and magnet open, revealing the bubble chamber whose internal length averages 80". Photo at right shows assembly closed.

An article printed last February in *THE BULLETIN BOARD*, entitled "The Bubble Chamber Story", gave an account of the use and operation of bubble chambers. This week's article deals more specifically with the 80" liquid hydrogen bubble chamber presently under construction at BNL for use at the Alternating Gradient Synchrotron (AGS).

Recently Donald A. Glaser received the 1960 Nobel Prize in Physics for his invention of the Bubble Chamber in 1952. This instrument has now almost completely replaced the Cloud Chamber which until then had served a similar purpose. A bubble chamber is a container filled with a liquid held at such a temperature and pressure that when the pressure is suddenly relieved the liquid becomes "unstable" and tends to boil. If an electrically charged particle passes through the chamber it will collide with the atoms in the liquid. Thus a small part of the energy of the particle is converted into heat resulting in an increase of the temperature in a tiny region near each collision. Since the liquid is already unstable, it will now begin to boil in these regions. If one quickly illuminates the chamber and takes a photograph one can see a trail of small bubbles outlining the path of the particle. Sometimes the particle comes close enough to the nucleus of an atom that a nuclear interaction occurs. Then the particle may be scattered through a large angle or secondary particles may be produced. Thus one can investigate the properties, interactions, and production of most of the elementary particles found in High Energy Nuclear Physics.

Bubble chambers can be filled with almost any liquid, such as propane, freon, or xenon, but one of the most useful ones is liquid hydrogen since its nucleus is simply a proton, which considerably reduces the complications en-

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BUBBLE CHAMBER—Cont'd

countered in interactions with more complex nuclei. Liquid deuterium consisting of one proton and one neutron can also be used when collisions with neutrons are desired. At Berkeley, where large liquid hydrogen bubble chambers were first built, a 72" long chamber is in operation. There are several smaller chambers at Brookhaven. For use at the AGS a chamber 80" long and 28" wide is being constructed. It will contain about 3 times as much hydrogen as the Berkeley chamber, namely 1500 liters. On the photographs one can measure the angles and lengths of tracks, also sometimes the bubble density which measures the velocity of a particle. If a magnetic field is applied the path of a charged particle becomes curved. This curvature is a measure of the momentum. When particles have high energies, as in the AGS, the resulting curvatures are very small and one usually has to measure long tracks. Also unstable particles that might be produced in nuclear collisions travel farther before they decay. These are a few of the reasons for making our chamber so large.

The chamber will be made of stainless steel and closed off by a 6-1/2" thick glass window. Pressure will be relieved – and restored – through a neck by a 36" diameter piston located at the top. The whole process of expansion, taking the photograph, and recompression will take only 1/50 of a second and we expect to repeat this once a second, the fastest repetition rate of the AGS. Since hydrogen is liquid only below about minus 400°F, cryogenic methods must be used to control it; the chamber, cooled by a liquid hydrogen refrigerator, is mounted in a high vacuum, and surrounded by a shield kept at liquid nitrogen temperature. It is illuminated through a window located at the same side of the vacuum chamber as are four cameras for stereoscopic photography. The light is reflected at the back side of the chamber. The whole assembly, including the chamber, expansion mechanism, vacuum tank, and the very heavy steel yoke and copper coils for the magnet, all shown in the accompanying pictures of a model, is mounted on an undercarriage which can elevate and rotate the chamber assembly and which can slide the total weight amounting to 450 tons on two rails located in the main works area of a building under construction at the north side of the AGS. With all equipment attached the assembly will stand about 20' high, 28' long, and 13' wide. The building will also contain power, control, and compressor rooms, as well as hydrogen safety devices and concrete radiation shields.

It is hoped to have the chamber in operation during the second half of 1962. Beams will be brought from the AGS to the chamber building by various focusing and beam separating devices. The many expected photographs will be scanned, analysed, and computed by groups at Brookhaven and many other laboratories. Much automated instrumentation is necessary in these latter phases of bubble chamber physics in order to keep up with the fast rate at which data can be obtained with large bubble chambers.

HOCKEY FANS

It isn't necessary to travel to New York City to see a professional hockey game. Now you can take the family on a short trip to Commack at the Long Island Sports Arena to enjoy a pleasant Sunday afternoon.

Discount tickets are available to Laboratory employees, their families and friends at the Recreation Office. Regularly priced \$2.50 seats are on hand for the reduced rate of \$1.40 each.

The ducats are good for the match between the New York Rovers and the

visiting New Haven club, on Sunday, January 22, at 3:00 p.m.

Tickets will be available while the supply lasts, but no later than Thursday.

ATTENTION, ARCHERY ENTHUSIASTS

Good News! An Archery Club has been formed and officers chosen. The BERA organization has given us sponsorship and within a few weeks an indoor range for winter will be established for members.

The next meeting will be held on January 24, at 5:30 p.m. in the Recreation Building.

THEATRE GROUP NOTICE

There will be a reading of J.B. (again) at the home of Cliff and Barbara Swartz in Old Field on Wednesday, January 25 at 8:30 p.m. Instructions for locating them are below. For more directions, call Cliff, Ext. 600.

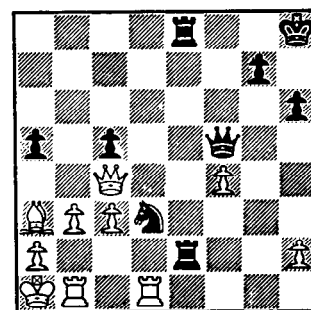
From the R.R. Station in Stony Brook, follow Quaker Path until it ends in a triangle at Old Field Rd. Bear left onto Old Field Road heading North with Conscience Bay on your right. At the first fork turn left, leaving Old Field Road, and starting on Mt. Grey Rd. After 500 feet Mt. Grey Road turns abruptly left, heading south. At this point, turn abruptly right, into road with side gates marked "Flax Pond Woods". After 1000 feet this road swings to the right around a small pond. The driveway is about 200 feet past this turn, on the right.

VALENTINE DANCE

One excuse is as good as another, and this one is fine for our purposes because everyone wants a BERA dance in February. So Hearts and Flowers it will be. Committee preparations have already begun. The decorating theme has been picked and an excellent band has been contracted for the occasion; the Starlighters, a 12 man outfit, have passed our auditions and will provide the musical entertainment.

You can make your plans to attend now as the date has been set for Friday, February 10. Admission will be \$1.50 each for employee and escort – \$2.00 per guest.

Additional help is being recruited to help make and hang decorations. We'd welcome your assistance. Call George Sabine, Ext. 391.

CHESS PROBLEM

Black to move and win

This week's game was played in Vienna in 1908 between Marshal and Salwe. Marshal, playing with black, won. It is black's move. Answer elsewhere in this week's BULLETIN BOARD.



BERA BOWLING

BLUE LEAGUE

The Techs continue in first place picking up another 4 points – this time from the Meteors – four of the Techs bowled better than 500 series. Wessel, who holds the high game honors for the league, was the only Tech off the pace. For the Meteors, Walsh bowled a 183 and Stelmaschuk a 172. Each of the Techs bowled one game better than 180. The total gross score of 2733 was enough to give the Techs a donated bundle of cheer – runner up for the prize was the last place Bubble Boys.

Second place Splitters, lost 3 points to the Bubble Boys. The "Boys" came on strong after losing the first game by 9 pins. They won the second by 217 pins and the third by 34. Ferrante had a 212, 527 series and Scheliga a 182, 516 series, both representing the Bubble Boys.

The Nuclides are in third place after bowling the Pacers who were sick. For the first time the Pacers lost 4 points. Majeski for the Nuclides bowled a 182, 509 series; the losers' only well bowler (Jackson) had a 186, 197, 529 series.

The Snafus took over 5th place from the Powermites by taking 3 points. For the Snafus last week's Blue Ball, Newman had a 170 game and Sucher a 172. The Powermites Walker bowled a 178, 502 series and Collier a 196 game.

Ed Meier of the Techs is the Blue Ball winner with his 606 gross series.

RED LEAGUE

The Bugs really bugged the Downunders for 3 points even with 4 men rolling for the Bugs. Shipley must have had enough free haircuts because he was out so T. Iarocci carried the team with a 552 series. As for the Downunders, Zahra (Zorro) got on his horse and did some stomping around to put his 470 on the line. The Downunders got **some help** (I use these words very loosely) from All-thumbs' G. Fales, who doesn't seem to know which end of the alley the pins are at. By dropping the ball behind him, he has become very popular. The Ladies' League also think him a very demanding player. Pat Towey of the Twinkle Toes offered him a position on their team as a ball-rack boy.

The Skins and Gnats rolled a hot 3 games – all 4 points in favor of the Skins (only 4 men too). The pushers for the Skins were Borzi 506, Lento 493, Schroeder 480 and Weinman with a 453. The Gnats that had some power left in their wings were VanNorman 540 and Wilson with a 479. Fox is the Captain of the Gnats – not VanNorman as was noted in last weeks' BULLETIN BOARD.

The Bismuth Kings and Biology opposed each other again (P.N.) but the results – 3 points – were in the B.K.'s favor this time. Both teams had only 4 men rolling but that didn't seem to worry the B.K.'s. The dead-eye men for the B.K.'s were Zinna 477 and their dark horse, R. Taylor, with a 504. For the Biology team Slow-ball Russica was out and McGovern did drink enough Coca-Cola.



NEXT WEEK
JANUARY 26, 27, AND 28

DETECTIVE STORY

— TICKETS: \$1.00 —

Joe Jach, director of the three act drama of life in a New York City detective bureau, reports that his large cast is about ready to scintillate. Rehearsals have been frequent and arduous, but the result is sure to please what could well be the largest audience ever to attend one of the Theatre Group offerings. Tickets will cost \$1.00 each and will be good for any seat, any night. People who want to sell tickets or wish to secure large blocs of them, please call Bob Fuchs, Ext. 394.

TICKET SELLERS

Tickets will be sold by the following people in addition to the cast: Mary Semerjian, AGS; Blanche Laskee, Reactor; Sophie Kostuk, Chemistry; Sally Kubik, Biology; Grace Jones, Nuclear Engineering; and George Sabine, Recreation Office.

CAST OF CHARACTERS

Joe Feinson.....	JERRY SADOFSKY, Metallurgy
Detective Dakis.....	JACK ROTHMAN, Physics
Shoplifter.....	VAL HUGHES, Personnel
Detective Gallagher.....	ROBB GROVER, Chemistry
Mrs. Farragut.....	PAT TOWEY, Physics
Detective Callahan.....	GEORGE HARDMAN, Hot Lab
Detective O'Brien.....	DON DAVID, Bubble Chamber
Detective Brody.....	FRED THOMPSON, Arch. Planning
Endicott Sims.....	GEORGE DIENES, Physics
Detective McLeod.....	JACK KELSCH, Nuclear Engineering
Arthur Kindred.....	GEORGE GRANDY, Reactor
Patrolman Barnes.....	DON BROWN, Bubble Chamber
1st Burglar (Charlie).....	CARL GOODZEIT, Physics
2nd Burglar (Lewis).....	CARMEN SPIRIO, Physics
Mrs. Bagatelle.....	JOAN SIEBERT, Physics Office
Dr. Schneider.....	JERRY LELLOUCHE, Reactor Theory
Lt. Monaghan.....	CARL WILSON, Reactor
Susan Carmichael.....	DORIS SEEBODE, Patent Group
Willy.....	CYRIL WOODBURN, Reactor
Miss Hatch.....	MARGARET DIENES, Tech. Information
Lady.....	BARBARA GARNIER, Physics
Gentleman.....	MANNY HILLMAN, Nuclear Engineering
Crumb-Bum.....	BILL GREENHILL, Reactor
Mr. Gallantz.....	DAVID GURINSKY, Metallurgy
Mr. Pritchett.....	CLIFF SWARTZ, Cosmotron
Mary McLeod.....	JANICE LOEHR, Malan Construction
Tami Giacoppetti.....	AURELIO ASCOLI, Physics
Indignant Citizen.....	MARGARET DAVIS, Malan Construction

Plan now to see this exciting drama! Thursday, Friday, and Saturday of next week – January 26, 27, and 28. 8:30 p.m. in the Theatre.

ATTENTION ALL GIRLS!

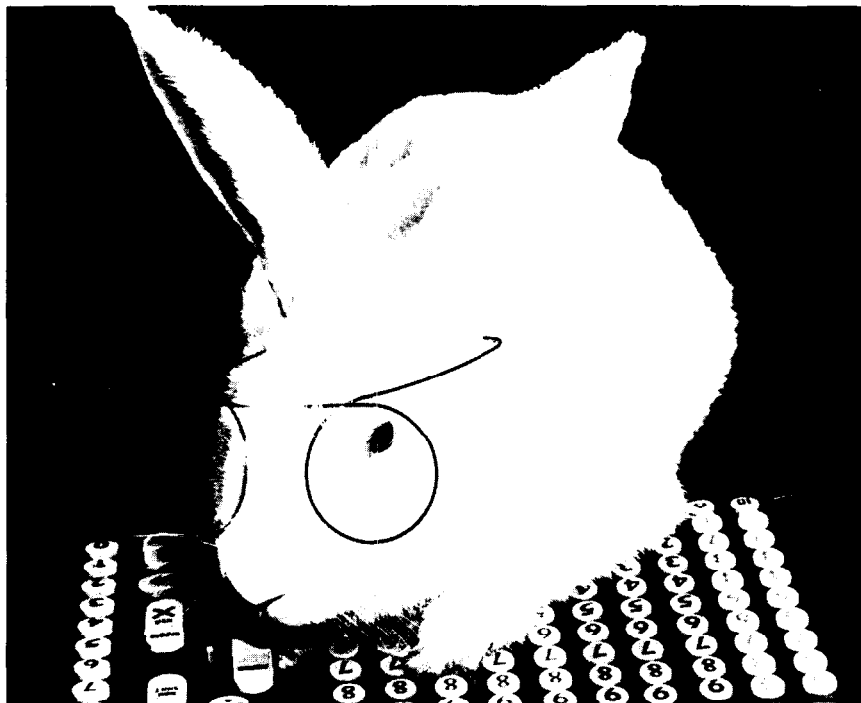
We are in desperate need of new bowlers to fill in one of our teams. Average is of no consequence, since we have a handicap league; if you've never bowled before – that makes "no never mind" either. How about joining in the fun, gals and join us every Wednesday night at 6:15 p.m. at the Patchoque Bowling Center. If interested please

call Grace Siemen, Ext. 2164, or G. Sabine, Ext. 391.

LADY KEGLERS COLUMN

With Medigals forfeiting four points to the All Thumbs, Odds & Ends dropping three points to the Alley Kats, and the Twinkle Toes taking four points from the APC's, the first five places in the league are rapidly closing up. Nightingales and Boo Boo's split 2-2.

HARE-RAISING CONTEST WON BY A WHISKER



A year's free subscription has been awarded to Mr. Welsh Rabbit, who was the first to call in with the correct answers - 1881 and 6009 - to the puzzle in last week's BULLETIN BOARD. While everyone else was in a stew over the contest, Mr. Rabbit hopped over to his computer and got the right answers. Although very pleased with his prize, he hinted that he might prefer some Fort Knox variety lettuce.

Second place winner is Eleanor Degen of Nuclear Engineering who will receive a six months free subscription to THE BULLETIN BOARD.

WHO'S LAUGHING NOW?

Odds and Ends, Wednesday night (women's team) were dumped twice with no effort by the Downunders (men's team).

Pizza pies and setups were paid for by the Odds and Ends and over-enjoyed by the men of the Downunders. Thank you, girls!

UPTON RIFLE - PISTOL CLUB

The U.P.P.C. pistol shooting program for 1961 will begin with participation in the East End League. The league consists of six teams: Brookhaven, Riverhead, Mattituck, Quogue, Southampton, and Upton. Shooting started on January 5 and will last until mid-March. Trophies will be awarded to winning teams. Old and new club members are invited to enroll in the league. Contact J. Diener, Ext. 624.

BNL SAFETY RECORD

There have been no disabling injuries at BNL thus far in 1961.

ANSWER TO CHESS PROBLEM

WHITE	BLACK
	1 N - K8
2 B X P	2 N - B7 check
3 K - N2	2 N - N5 Discovered check and mate to follow.

(White could have played 2 R X N R X N, etc., but that would have only prolonged the game.)

CLASSIFIED ADS

FOR SALE

1953 FORDOMATIC - New paint, tires, battery, carburetor, shocks, runs well; \$225. Hank, Ext. 601.

1955 CHEVY 210 - 4 door sedan two tones, heater and new radio, snow tires, new seat covers, owner leaving the country; best offer above \$500. Call Ext. 634 or 749.

1956 FORD CONVERTIBLE - Salmon and white, fully equipped, new top. Tony Wisowaty, Ext. 791.

1950 FORD - 2 tone blue, priced to sell fast, excellent cond., buyer must see to appreciate. Call G Rover 5-4199 after 5:30 p.m.

1956 FORD - V-8, 2-door, automatic transmission, excellent cond. \$625. Call Ext. 301-110.

HOUSE - 8 mi. from Lab. Mastic, 6 rms, hot water heat. Full basement (partly finished). 80x100 ft. Anchor-Fence enclosed plot. AT 1-8532 anytime.

HOUSE - Modern 7½ room ranch, large living room fireplace, 3 bedrooms, large paneled rec. room, pantry, basement, attached 4 car garage, patio, playhouse, barn, ¾ acre corner plot, ideal location. Debons, Ext. 301-26.

RANCH HOUSE - Oakdale, 6 rooms, 3 bedrooms, full basement, storm doors, screens, venetian blinds, other extras. \$13,000. Take over existing \$11,500 FHA 27 yr 5¼% mortgage. Call Ext. 2259 or Sayville 4-4497.

HOUSE - 2 bedrooms, living room, dining room, kitchen and bath, cellar, oil fired hot air heat, storm windows and doors, 2 car garage with patio. 7½ acres of land located on Coram-Mt. Sinai Road, Coram. Call SE 2-5518.

34 FT. CABIN CRUISER - Sportfisherman, sleeps four, galley, dinette, standup head, outriggers, fighting chairs. 130 h.p. Chris-Craft, 1½x1 reduction. Good family boat. Priced for quick sale \$2800. Ext. 392.

PRAM - 8 ft. \$40. 1½ h.p. Evinrude \$20. Package deal \$55. Call John T. Ext. 2376.

REFRIGERATOR - Hotpoint 6 cu. ft. excellent cond. Atlantic 6-8206.

ENCYCLOPEDIA - 21 Volume "The Illustrated Encyclopedia of Knowledge" for older children and adults. 1955-57 deluxe edition plus '57 and '58 year books. \$25. Borg, Ext. 301-7.

18 FOOT CAPE COD KNOCKABOUT - Damaged in hurricane Donna. Fine chance for someone handy with tools to get a good boat cheap. H. Kuper, Ext. 428.

LAWN ROLLER - Large size in very good condition. \$10. Call JUniper 1-3319.

MATTRESS - for Roll-Away-Bed. Cost \$19. Used twice, asking \$10. One folding bridge chair, plastic covered gold-beige, practically new, asking \$4. Atlantic 6-9357 after 5 p.m.

FOR RENT

APARTMENT - 3 room furnished, all utilities and garage. Middle Island. \$90. Yaphank 4-6426.

WANTED

HOME for 7½ week old female kitten. Vise, Ext. 467 or 605.

METRONE - Hillman, Ext. 779.

3 H.P. JOHNSON OR EVINRUDE - 2 or 3 years old. Ext. 2381.

INTERESTED in attending evening painting class at Bellport High School? Call Cynthia Corngold, Bellport 7-0923-W.

A SLED - Call L. Belkin, Ext. 563.

CAR POOLS

Steady ride wanted 8:30-5:00. Lindenhurst vicinity, Sunrise Highway, 4 blocks/West Wellwood Ave. Size 44. Arthur Roy, Ext. 580.

Interested in joining car pool in South Huntington - Huntington Station area. Call M. Steinberg, Ext. 340.

Would like to join car pool from vicinity Blue Point Ave. & Middle Rd., Blue Point, J. Shaber, Ext. 553.