

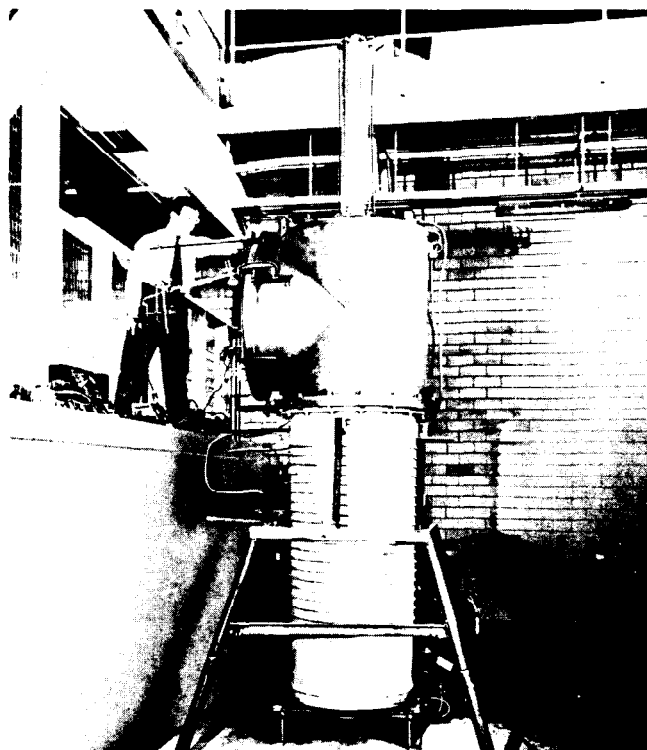
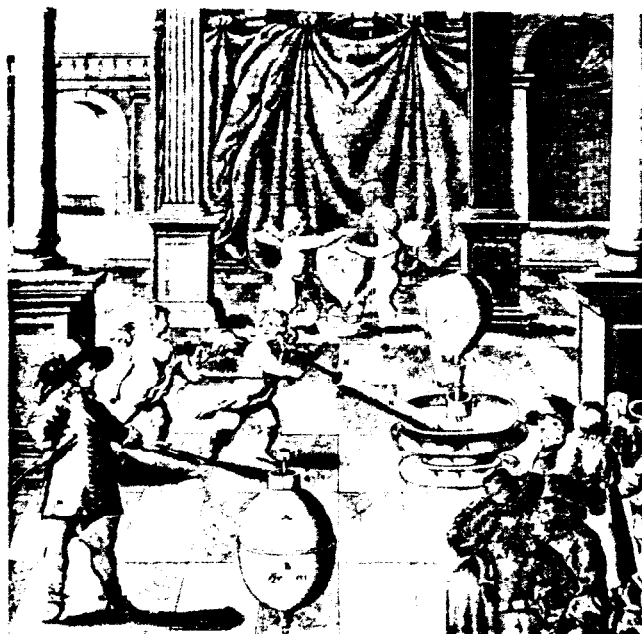
the Bulletin Board

VOLUME 14 - NUMBER 27

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MARCH 14, 1961

VACUUM TECHNOLOGY



Left: Early representation of von Guericke's first pump.
Right: 32 in. diffusion pump and valve.

DISCOUNT TICKETS

Discount tickets to the following shows are available at the Personnel Office, 58 Brookhaven Avenue:

ELSA LANCHESTER - "HERSELF"
(41 st St. Theatre, N.Y.C.)

CLYDE BEATTY - COLE BROS. CIRCUS
(L.I. Arena, Commack)

RINGLING BROS. BARNUM & BAILEY CIRCUS
(Madison Square Garden, N.Y.C.)

WANTED - USED TECHNICAL BOOKS

The students and scientists of South America are in need of technical text books and handbooks. The shortage is so acute that often students are forced to wait in line to read the few textbooks that are available.

There may be many books on your shelves, or in your attic or basement, that you no longer use or need which could help these students. Any technical books that you contribute to South America will be greatly appreciated.

Send all books to "Books for South America" - Building 137, or call J. Weiss, Ext. 2472.

Few technologies are pertinent to as many scientific disciplines as vacuum technology. Its uses in physics, particularly nuclear physics, are too numerous to list. Chemists, metallurgists, astronomers, and cosmologists all utilize vacuum technology. Vacuum freeze-drying is used to prepare and preserve antibiotics, tissues and sera in medicine and biology.

The application of vacuum techniques has pervaded our homes and influenced our daily fare. For example, the powdered instant coffee of today is considerably improved over that of fifteen years ago. This is because the coffee is not boiled to drain off the water; instead, the water is evaporated at a low temperature under vacuum, and thus the taste is not altered. Most frozen juices are produced and prepared at a reduced pressure for the same reason.

Vacuum is an old technology dating to the middle 17th century; Torricelli performed his mercury barometric experiments in 1644. Von Guericke built the first vacuum pump in about 1650. This pump, as shown at left above, consisted of a cylindrical tube with two valves and a piston and operated similarly to a modern bicycle pump, only in reverse. Water was freely used to make the joints air tight. (It is inadvisable to use a pump of this type on a modern system, since the winged cherubs are too difficult to obtain.)

The modern period of vacuum pumping can be considered to have started in 1905 with Gaede's rotary pump. Most mechanical pumps of today trace their origin if not their design to Gaede. The principal improvements have come in increasing the capacity of the pumps and reliability of the seals. These mechanical pumps can produce vacuums on the order of 10^{-3} mm Hg or one one thousandth of a mm, compared to normal air pressure of 760 mm Hg.

(Please turn to Page 2)

Vacuum Technology — Cont'd.

Many applications, such as the production of high quality vacuum tubes or the operation of nuclear accelerators, require much lower pressures than this, however. In an accelerator, the charged particles being accelerated must be able to travel long distances, sometimes thousands of miles, without being scattered appreciably by collisions with air molecules. In addition, a high vacuum is also necessary to enable parts of the machine to withstand very high voltages which may be utilized.

The workhorse of high vacuum pumps is shown at right above. This is the oil diffusion pump, operating on a principle invented separately by Gaede in Germany and Langmuir in the U.S. In these pumps, a stream of oil or mercury vapor entrains air molecules and brings them to a part of the pump where they can be evacuated to the atmosphere. This figure illustrates a 32 inch pump capable of evacuating 30,000 liters per second at a pressure of 10^{-5} to 10^{-6} mm Hg. The Cosmotron pumps are similar to these except in size.

The pumps used on the AGS operate on a principle of relatively recent development. Oxygen, nitrogen, carbon dioxide, hydrogen and water are chemically removed from the vacuum chamber by causing them to unite with freshly evaporated titanium. This chemical process, called gettering, is not new but its use as a continuous process is. The noble gases (argon, helium, neon, etc.) are pumped electronically, by first ionizing them and then driving them into the pump walls with an electric field.

Ultra-high vacuum, so important in thermonuclear work and space simulation, has proceeded into regions unmeasurable just a few years ago. Vacuums of the order of 10^{-15} mm Hg are now produced and measured routinely in small laboratory systems. Progress has been made in evacuating industrial size systems to 10^{-12} mm Hg. The limitation on these systems is often found to be the permeation of hydrogen through the walls, and so double vacuum chambers are necessary.

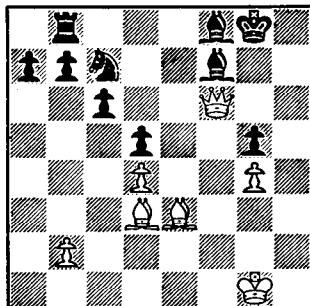
To show how puny are our efforts to reduce molecular density, or pressure, however, it should be remembered that the best vacua obtainable on earth are very poor compared to those of deep space. The density of a gas at 10^{-15} mm Hg is on the order of 10^6 molecules per cc., while it is estimated that the density of space is about 1 molecule per cc. Ipso facto, build the next BNL accelerator on the moon.

LAWN BOOKLET

In spring, a homeowner's fancy turns to his lawn. Copies of the booklet "Planting and Maintaining a Lawn" by Ed Hunter of Plant Maintenance are available at the Personnel Office, 58 Brookhaven Avenue.

CHESS PROBLEM

In this week's problem, it is white's move and win. Answer elsewhere in this week's BULLETIN BOARD.



We all have weaknesses. But I have figured that others have put up with mine so tolerably that I would be much less than fair not to make a reasonable discount for theirs.

—William Allen White

FIFTH BROOKHAVEN LECTURE

By Herbert Kouts,
Nuclear Engineering Department.

Title: Neutron Physics of and with the High Flux Beam Reactor

Lecture Hall: 8:00 p.m., Wednesday,
March 15th

A buffet supper (\$2.75) will be served at the Brookhaven Center before the lecture, beginning at 6:00 p.m. Reservations should be made at least one day in advance, by calling Extension 2302 before 5:00 p.m. or Extension 2453 in the evenings.

Refreshments will be available in the Research Staff Lounge following the lecture.

UPTON RIFLE AND PISTOL CLUB

Spring large bore rifle shooting will start Sunday, April 9, at the Medford range. Time — 10:00 a.m. to 12:00 noon.

The Rifle Club has six M 1's available for those who do not have their own rifles. Trophies will be awarded to the winners. For details contact A. Lukas, Ext. 769, or P. Colombo, Ext. 624.

BNL SAFETY RECORD

11 Days since last Disabling Injury
(March 2nd — March 13th)

RECREATION BUILDING

(York Lane — Apartment Area)

OPEN — Monday through Thursday.
5:00 p.m. — 11:00 p.m.

SCHEDULE — Lounge available to all at all times. A variety of social recreational activities are scheduled weekly. (Including dance instruction, folk dancing, club meetings, lectures, parties, and small dances).

FACILITIES — Rooms downstairs include a large hall for dancing, a fully equipped kitchen, a comfortable lounge and utility room. The upstairs level houses Club Room facilities such as: Camera Club Darkroom, Model Railroad Club, Rifle Pistol Club, Skin Divers Club, and the Ceramics Work Room.

EQUIPMENT — (For employees' use at the building) Television, Record Player, F.M. Radio, magazines, Chess and Checkers sets, 8-16 and 35 mm projectors and screen, playing cards, Table-Tennis table, and a piano.

REFRESHMENTS — Cigarettes, Candy and Liquid Refreshments available at all times.

RESERVATIONS — By special arrangements the building will be opened at other than normally scheduled hours, if desired, for group or departmental parties.

ATTENDANT — A B.E.R.A. employee is on hand at all times to assist with individual as well as activity needs.

INFORMATION — For additional information, schedules, or reservations contact the Recreation Office, 3 Center Street, Ext. 391.

RENTAL LIBRARY

Among recent additions to the rental library at the Personnel Office, 58 Brookhaven Avenue, are:

ARE YOU HUNGRY ARE YOU COLD

EVVIE	LUDWIG BEMELMANS
A DISTANT TRUMET	VERA CASPARY
ANNA TELLER	PAUL HORGAN
CHINA COURT	JO SINCLAIR
MEETING AT A FAR MERIDIAN	RUMER GODDEN

THE ENEMY WITHIN	MITCHELL WILSON
COPPER BEECH	ROBERT F. KENNEDY
AFRICA IS ADVENTURE	ARIADNE THOMPSON
	ATTILIO GATTI

ARCHERY CLUB

Pam Dewick of the Bubble Chamber Group is one of our "Upton Archers," a newly organized archery club which lists its membership at about 35 employees. The club at present is taking advantage of its newly acquired indoor range at the Gymnasium every Monday evening from 7:30 to 10:30 p.m. A range captain is on hand at all times to coordinate the activities.



While we have several advanced archers, the club welcomes all newcomers, novices or experts. Experienced bowmen are on hand to give pointers and necessary instruction to the novices.

Films, courses of instruction, competition, expert demonstrations and outdoor activity are all possible club activities now under discussion by the club. For further information come out and talk to the officers on Monday evening or call Al Delp (President), Ext. 439; Al Tierney (V. President), Ext. 2356; Frank Humphrey (Secretary), Ext. 451, or the Recreation Office, Ext. 391.

FINAL CONCERT

The final concert of the 1960-1961 series will take place Wednesday evening, March 29 at 8:30 p.m. in the Research Staff Lounge. The featured artists will be the violist Paul Doktor and the pianist Yaltah Menuhin. Single tickets will be sold at the concert for \$3.00 (adult) and \$.75 (children and students).

The concert committee would welcome anybody who wishes to join us in planning and running next year's series - look us up at the March 29 concert or call Rudy Sher, Ext. 453.

ANSWER TO CHESS PROBLEM

White breaks up the game with bishop to rook 7 check, winning two pieces for one.

SOFTBALL SEASON

Really! It's not too far off. Just around the corner of April, and now is the time for departments to start filling out their rosters. If you had a team in our "Slo-Ball" league last year - round your teammates up and make sure your're going to play again.

If your department or group doesn't have a team it ought to be ashamed of itself. This is a game everyone plays - slow pitching, plenty of hitting and fielding exercise. Twelve teams competed in 2 leagues in 1960. Games are played immediately after work and teams are scheduled only once a week. New teams and new players are always welcome - find out why your group doesn't have a team.

In the near future detailed information about the leagues will be sent to last year's captains to prepare them for a general meeting which will be held at noon on March 23rd at the Recreation Office to start the organization of this season's activity.

Call or stop at the Recreation Office (Ext. 391) for information or entry blanks.

**BERA BOWLING****RED LEAGUE**

Biology went ahead and took 3 points again - this time from the Skins. It looks like they "speak softly but carry a big broom." The Biology man who used the broom to make a clean sweep was McGovern with a 516. The Skins who worked hard to get that one point were Borzi with 473 and Schroeder with a 506.

The Downunders got hot once again and took all 4 points from the Gnats. As a team the Downunders rolled well with one outstanding man, M. Iarocci, with a 559. The Gnats rolled it off with only three men. Out of the three men, Van Norman rolled a striking 591 to give him high series in the League so far.

The Bugs took the Bismuth Kings apart again, winning 3 points. The flashy-shirted Bugs' power was Laurie with a 456 and Shipley with a 513. The Bismuth King who fought hard for the one point was J. Varela with a 451.

BLUE LEAGUE

The Techs and the Powermites postponed their match.

The Nuclides won 3 from the Bubble Boys. For the Nuclides Weiss bowled a 200 game, Kukacka a 180. The Bubble Boys' Scheliga rolled a 213, 178-536 series.

The Meteors won four from the Snafus with steady, if not spectacular play. Lambeck was

high man for the winners with a 179 game: For the Snafus, Uddman rolled a 196.

The Splitters took 3 from the Pacers as Spira rolled a 211 and Sick a 214, 192-565 series. The Pacers' acting Captain, Jackson, bowled a 201, 187-549 series followed by Dexter's 182 game.

Blue Ball of the Week, in a not even close contest, to the Snafus' Bob Sick with a gross 616.

PURPLE LEAGUE

The Designers took 3 points from the Scotches to extend their lead to 6 points and close the door on first place. It now looks like the Designers will be the champs again this year. The champs were F. Dugan 162, Ed Sperry 224-543, J. Roeklein 213, 210-590. For the Scotches it was B. Galen 179, W. Johnson 168-489, F. Cermak 167. The Woodbutchers, this time a 3 man team, split with Fiscal and moved within 1/2 point of the 2nd place Scotches, the fight now being for 2nd place. The Woodbutchers were R. Lewis 187, W. Milain 177-479. Fiscal had B. Rutkowski 183-472, R. Eberbach 160. A. Saletros beamed with pride after receiving a plaque from his fellow bowlers. It is on display in his office.

The Bowl Aids, led by Bud Sawyer 183-504, took 3 points from the Hopefuls. Helping him were R. Schulz 156, Ed Walsh 148. The Hopefuls took the last game by one pin with Alex Hanson 158-415 and Ken Thomson 163.

The Dirty Birds ganged up on the Phoubars and took 3 points from them. Dirty Birds' gang was V. Buchanan 141, J. Grisoli 162, G. Kuzmack 211-488, A. Dick 190-515. The Phoubars trying were R. Caiazza 162, R. Brown 162, and D. Vogt 194-482.

CAMERA CLUB

The next meeting of the Camera Club will take place on Wednesday, March 21, at the Recreation Building in the Apartment Area.

A guest speaker, Bob Walton, of the BNL Photography Group, will discuss problems in flower photography. The talk will be followed by a shooting session of various flowers (which will be provided).

MIXED TOURNAMENT CHAMPS

Forty one teams competed in the handicap bowling event last Saturday, rolling 3 games across 6 alleys. It became obvious that the tournament was a success when the bowlers began asking, "When is the next one?" Before we get to that, let's take a look at the winners:

- 1st place - S. HIDDINK, R. GAFFGA
Trophy and Bowling Balls
- 2nd place - R. WATSON, J. NEWHOUSE
Trophies and Bowling Shoes
- 3rd place - G. SIEMEN, E. FALES
Trophy and Bowling Bags
- 4th place - W. REAMS, P. FERRIGNO
Trophy
- 5th place - L. LENTO, D. SCHWARTZ
Trophy
- Ladies' High Game plus handicap
MARIE KOLLMER, 222 - Trophy
- Ladies' 2nd High Game plus handicap
S. HIDDINK, 215 - Bottle of Cheer
- Ladies' Low Game
MRS. HAGELBERG, 37 - Trophy
- Men's High Game plus handicap
JOHN McCAFFERTY, 245 - Trophy
- Men's 2nd High Game plus handicap
R. WATSON, 242 - Bottle of Cheer
- Men's Low Game
E. Caiazza, 92 - Trophy

At this time we'd like to thank Len Baker, who contributed so much to the Tourney's organization, and G. Hardman, R. McCann and B. Sylvester for their help at the alleys.

CLASSIFIED ADS**FOR SALE**

1960 STOCK PONTIAC - 360 h.p. 3 two barrel carbs., all tinted glass, power brake, standard trans. W.W. tires, undercoating, windshield washers, plastic covers, DeLuxe r&h, copper color, 6470 miles, orig. cost \$3475 will sell for \$2600. Call Ext. 445 or GR 5-5562 after 6 p.m. Steve Pollis.

1959 CHEVROLET - Impala, 2 dr sedan, white, auto-trans., low mileage, \$1700. Ext. 664, Mary.

1953 WILLYS - Station wagon, 6 cylinder, 2 wheel drive, \$175. Ext. 2148.

1952 HILLMAN - 4 dr. sedan, recent work done, 30 mpg, 250-300 mpq. Economical second car for local use. Best offer over \$125. Call J. Walsh, Ext. 454.

1951 PLYMOUTH - 2 dr. station wagon, rebuilt Sears engine, many new parts, new slip covers, body poor, needs tune up, Ed. Potter, Ext. 2456. Asking \$50.

1940 DODGE - running condition and recently inspected. Best offer. Ext. 773.

RANCH HOUSE - 2 bedrooms, separate dining room, large living room with fireplace, large kitchen completely equipped plus dishwasher, screened in breezeway, finished basement, playroom, front and back porch, garage. \$17,000. Call GR 5-8391.

HOUSE - 7 rooms, 4 bedrooms, 1½ baths, washer-dryer, fully landscaped 75x150 lot, many extras, located in Bellport Beach Estates. Beach rights, owner leaving Lab. Price \$15,900. Call Ext. 456 or AT 6-8813.

HOUSE - Beautiful split level, ½ acre wooded lot, private beach rights, 3 bedrooms, fireplace, dishwasher, 26 ft recreation room, laundry room. SH 4-9877 evenings.

RICHARDSON - 26 ft. repowered 1958, 4 sleeper trunk cabin, extras. BA 8-1759.

1957 SHELL CRAFT - 18 ft. sleeps 2, shelter cabin and navy top, 1957 30 h.p. Johnson outboard electric starter and trailer. All in good cond. \$1,000, Ken Thomson, Ext. 566 or JU 8-2809.

16 FT. SAILBOAT - Comet Class, double planked, top cond. 12 ft. fiber-glassed row boat with 5 h.p. Gale outboard engine run less than 50 hr. V.L. Sailor, Ext. 541.

4 WHEEL BOAT TRAILER - Homemade from automobile frame, tires good, price right, \$35 Ext. 2255.

10 H.P. 1959 JOHNSON OUTBOARD MOTOR - with 6 gal. pressure tank, used one season. \$175. J. Semkus, Ext. 566.

FRIGIDAIRE - 13 Cu.Ft. in very good cond. \$20. Call AT 1-8253 or Ext. 635.

DRESS FORM - 6 way adjustable dress form with iron backbone and base, covered. Model "A" by Acme. \$8. A. Minardi, Ext. 346. After 5 p.m., YA 4-3581.

TRANSCIVER - Citizen band transceiver, super heterodyne Lafayette model # HE 15 complete with 12 V convertor, used 3 months. Call, Ext. 2381.

WANTED

ATTENTION HUNTER'S - Home for foxhound puppies 8 weeks old - 3 males, 1 female. Call E. Bauer at AN 1-8234.

HOME - for four week old male dog. Call AT 9-0632.

USED GUITAR - in good cond., preferably Spanish type. Call Ext. 2106.

BICYCLE - Girl's 20" in good cond. Borg, Ext. 301-7 or BE 7-0428.

BABY CRIB - and mattress in good cond. Call Ext. 436 or evenings SET 6-0923.

SHOPSMITH - Mark V in like new cond. Contact S. Earle, Ext. 591.

FOR RENT

APARTMENT - 4½ rooms centrally located in Patchogue, unfurnished. Call GR 5-1880.

CAR POOLS

We need one person to complete an already established 5 man carpool. We would like person living within area bounded by Montauk Hwy., Sunrise Hwy., Medford Ave. and Phyllis Dr. Anyone interested please call M. Rosso, Ext. 548.

Want to join or form 2-3 man carpool vicinity N. Prospect Ave., Patchogue. Call Sadofsky, Ext. 354.

Would like to join or form carpool from Mattituck. Vera Scott, Ext. 2180.