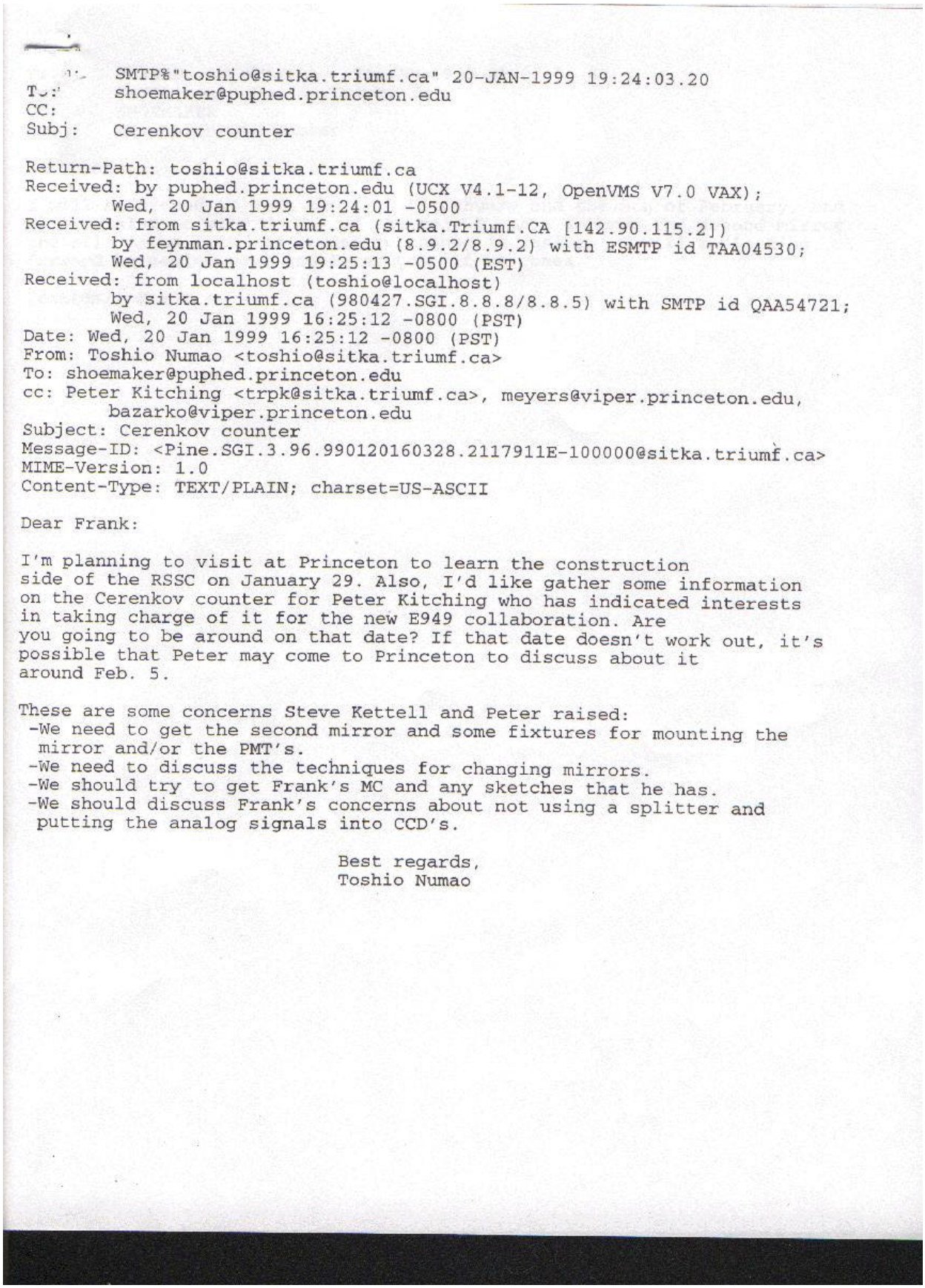


SMTP%"toshio@sitka.triumf.ca" 20-JAN-1999 19:24:03.20
To: shoemaker@puphed.princeton.edu
CC:
Subj: Cerenkov counter

Return-Path: toshio@sitka.triumf.ca
Received: by puphed.princeton.edu (UCX V4.1-12, OpenVMS V7.0 VAX);
Wed, 20 Jan 1999 19:24:01 -0500
Received: from sitka.triumf.ca (sitka.Triumf.CA [142.90.115.2])
by feynman.princeton.edu (8.9.2/8.9.2) with ESMTP id TAA04530;
Wed, 20 Jan 1999 19:25:13 -0500 (EST)
Received: from localhost (toshio@localhost)
by sitka.triumf.ca (980427.SGI.8.8.8/8.8.5) with SMTP id QAA54721;
Wed, 20 Jan 1999 16:25:12 -0800 (PST)
Date: Wed, 20 Jan 1999 16:25:12 -0800 (PST)
From: Toshio Numao <toshio@sitka.triumf.ca>
To: shoemaker@puphed.princeton.edu
cc: Peter Kitching <trpk@sitka.triumf.ca>, meyers@viper.princeton.edu,
bazarko@viper.princeton.edu
Subject: Cerenkov counter
Message-ID: <Pine.SGI.3.96.990120160328.2117911E-100000@sitka.triumf.ca>
MIME-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII

Dear Frank:

I'm planning to visit at Princeton to learn the construction
side of the RSSC on January 29. Also, I'd like gather some information
on the Cerenkov counter for Peter Kitching who has indicated interests
in taking charge of it for the new E949 collaboration. Are
you going to be around on that date? If that date doesn't work out, it's
possible that Peter may come to Princeton to discuss about it
around Feb. 5.

These are some concerns Steve Kettell and Peter raised:
-We need to get the second mirror and some fixtures for mounting the
mirror and/or the PMT's.
-We need to discuss the techniques for changing mirrors.
-We should try to get Frank's MC and any sketches that he has.
-We should discuss Frank's concerns about not using a splitter and
putting the analog signals into CCD's.

Best regards,
Toshio Numao

This is the first Email

From: PUPHEP::SHOEMAKER 21-JAN-1999 09:22:52.59
To: SMTP%"toshio@sitka.triumf.ca"
CC: SHOEMAKER
Subj: RE: Cerenkov counter

Hi Toshio,

I will be around on both the 29th of January and the 5th of February, and will be glad to provide all of the help I can. We have the second mirror and all of the fixtures needed to change it easily. I will be looking forward to seeing you, and Peter too, if he comes.

Regards, Frank

Hi Peter,

The computer bombed while I was typing a note to you, so I'll make a DOS file of my message and send it that way - that way I can edit/recover.

I expect to come to BNL on Thursday, Feb. 4, to bring some hardware for working on the Cherenkov, the 800 MeV/c Kaon mirror, and to talk with you about how it is built. Unfortunately, we do not have detailed assembly drawings for it, but I don't think you'd need them.

I will want to have the counter delivered to the hi-bay in the physics bldg and to have someone there who can legally operate the crane (I could, but they won't let me). I think you can get Joe Cracco to bring the counter over.

I think that it would be a good idea if several people were on hand to learn how getting into the counter to change a mirror or a phototube is done. I would suggest: you, Steve Kettell, maybe Kelvin Li, and any technician Steve or Kelvin would suggest that you might use to help you work on the counter. I think that Joe Cracco should also get acquainted with the counter.

I expect that I would arrive around 9:00 AM, and that this would all take only an hour or so (if the counter is delivered ahead of time). Since my daughter is visiting here next week, I will want to get away without delay. I may, or may not, stay for lunch, depending on how this all goes.

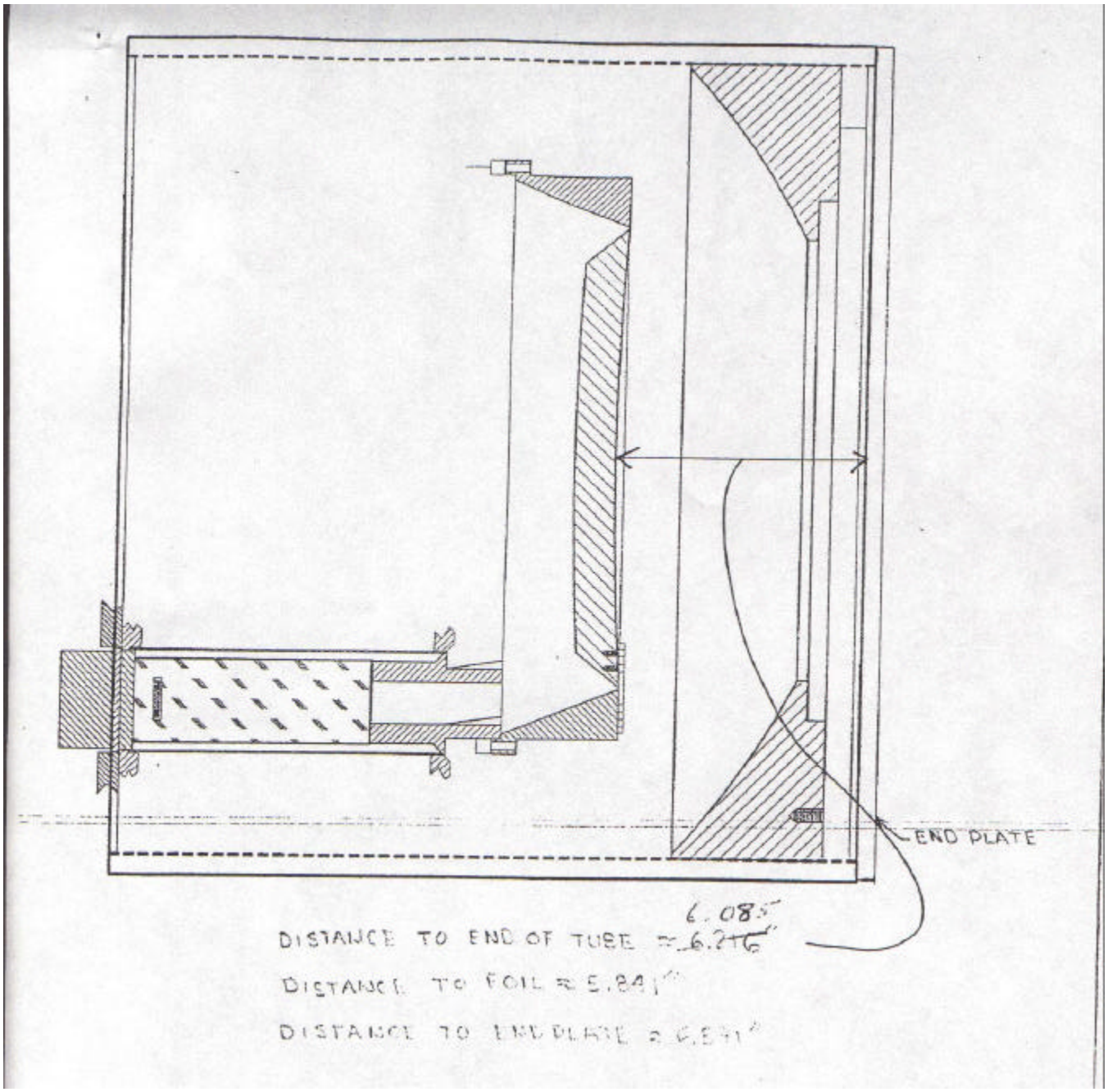
In the past, when I worked on the counter there, Kelvin made all of the arrangements described above.

I'll see you Thursday.

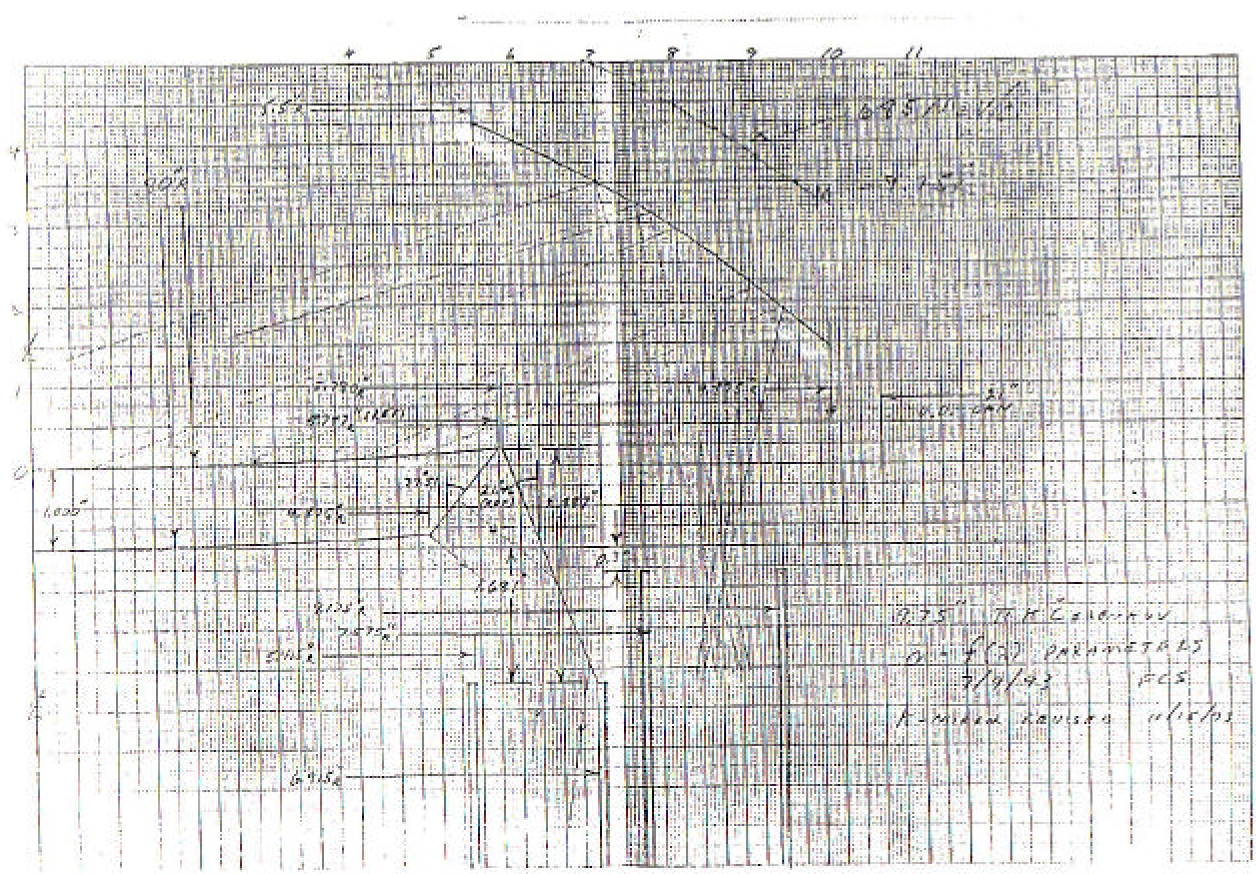
Regards, Frank

```
 Volume in drive C is MS-DOS_6
 Volume Serial Number is 2259-8D46

 Directory of C:\KPICHRNK

02/28/97  11:00a        <DIR>          .
02/28/97  11:00a        <DIR>          ..
01/04/99  01:42p                   196 kcherenk.dat
01/04/99  01:41p                   161 picerenk.dat
07/24/97  01:58p                19,119 picerenk.for
01/15/98  11:31a                12,715 winstonk.for
07/22/97  03:21p                12,300 winstonp.for
07/24/97  01:58p                19,102 winstonp.OBJ
07/24/97  01:58p                25,293 picerenk.OBJ
03/24/97  12:40p                 2,496 picerenk.map
07/24/97  01:58p                57,298 picerenk.exe
03/25/97  02:30p                    56 FLC2.BAT
01/15/98  01:51p                17,647 KCHERENK.OBJ
01/15/98  01:51p                19,632 WINSTONK.OBJ
01/15/98  01:51p                54,284 KCHERENK.EXE
03/27/97  01:51p                 6,579 kmirror.for
03/09/98  11:50a                    63 MIRORDAT
03/27/97  01:53p                 1,681 KMIRR.FOR
03/27/97  01:51p                 7,604 kmirror.OBJ
03/27/97  01:51p                38,506 kmirror.EXE
03/27/97  01:53p                 2,027 kmirr.OBJ
03/27/97  01:53p                35,042 kmirr.EXE
03/06/98  11:24a                    33 MIRRDAT
03/25/97  12:52p                    47 flc.bat
03/27/97  02:55p                 2,051 WINCONE.FOR
03/27/97  02:55p                 3,458 WINCONE.OBJ
03/27/97  02:55p                35,652 WINCONE.EXE
03/27/97  02:56p                    12 WINCONE.DAT
03/27/97  02:57p                 4,148 WINCONE.PRN
04/23/97  11:09a                14,124 kcherenk.bak
03/24/97  03:39p                12,459 winstonk.bak
06/12/97  03:41p                   778 GAUSS.FOR
06/12/97  03:42p                 1,500 GAUSS.OBJ
06/12/97  03:42p                31,670 GAUSS.EXE
05/01/97  02:19p                   294 WS_FTP.LOG
05/01/97  02:19p                 6,497 random.txt
05/06/97  12:03p                   886 tstRAN.for
05/02/97  01:31p                 2,251 rmarin.for
05/02/97  02:11p                 1,071 ranmar.for
05/02/97  11:41a                    63 flc3.bat
05/06/97  12:04p                 1,235 tstran.OBJ
05/06/97  12:04p                 1,563 ranmar.OBJ
05/06/97  12:04p                 2,053 rmarin.OBJ
05/06/97  12:04p                29,418 tstran.EXE
05/02/97  12:21p                 2,483 tstran.map
05/06/97  11:58a                   463 TSTSUB.FOR
05/06/97  12:06p                   143 DUMTIM.FOR
05/06/97  12:07p                   907 TSTSUB.OBJ
05/06/97  12:07p                   326 DUMTIM.OBJ
05/06/97  12:07p                26,812 TSTSUB.EXE
06/12/97  03:42p                   393 GAUSS.PRN
06/12/97  04:40p                   626 EPEAK.FOR
06/12/97  04:41p                 1,126 EPEAK.OBJ
06/12/97  04:41p                25,596 EPEAK.EXE
03/24/97  11:37a                18,411 picerenk.bak
```

```
03/24/97  02:10p                12,045 winstonp.bak
01/15/98  01:46p                15,365 kcerenk2.for
01/15/98  11:52a                17,659 KCERENK2.OBJ
01/15/98  11:52a                54,300 KCERENK2.EXE
01/15/98  11:27a                15,365 KCERENK.
01/15/98  01:51p                15,366 KCHERENK.FOR
03/06/98  11:24a                12,886 MIRRPRN
01/26/99  03:07p                     0 DIR.DSK
              63 File(s)        703,336 bytes
                            487,522,304 bytes free
```


END PLATE
6.085"
DISTANCE TO END OF TUBE = 6.276"
DISTANCE TO FOIL = 5.841"
DISTANCE TO END PLATE = 6.841"

This


PARAMETERS
FCS

```
      PROGRAM KCHERENK
C     This is a variation of KCHERENK which does the convolution with
C     The beam momentum distribution provided by Phil Pile.  1/12/98
C     Modified 6/25/96 to run on PC-9
C     Modified 7/1/93 to include variation of index of refraction
C     with wavelength.
C     Putting the Winston Cone parameters in KCHERENK.DAT.
C     This version allows the radius of the upbeam and downbeam faces
C     of the radiator to be specified. (1/23/91).
C     Modified to give single electron signals a pulse height spread.
C     This program is a MonteCarlo which traces light through a
C     Fitch-type kaon identifying Cherenkov counter with an
C     annular parabolic mirror and a ring of phototubes equipped
C     with Winston cones.  It is designed to work with WINSTONK.
C     It expects to read the following data from file KCHERENK.DAT
C     in format:   (Dimensions are in inches.)
C     2I5  ISEED, NPHOT
C     6F11.3  REFN, P0, FOCD, XMIN, XMAX, SIGY
C     6F11.3  SIGXP, SIGYP, THETAM, FOCL, RADFOC, REFMIRR
C     6F11.3  D, RADRAD, ZMAX, ZMIN, DIA, WID
C     6F11.3  CYLEXT, ZFOC, ZWIN, EFFNCY, REFLEC, GAIN
C     2F11.3  WIDCONE, HCONE
C     I5  N0
C     ISEED is the seed for the random number generator.  It should
C     be a large odd number.
C     NPHOT is the number of phototubes.
C     REFN is the index of refraction of the radiator. (Not really
C     used, the index varies with wavelength.)
C     P0 is the central kaon momentum in MeV/c.
C     FOCD is the distance from the radiator to the beam focus.
C     XMIN and XMAX are the edges of the beam, taken to be uniform.
C     SIGY is the sigma of the beam height, taken to be gaussian.
C     SIGXP is the sigma of the random horizontal angular beam spread.
C     SIGYP is the sigma of the vertical angular beam spread.
C     THETAM is the mirror axis angle (degrees) w.r.t. the beam axis.
C     FOCL is the focal length of the mirror.
C     RADFOC is the radius of the focal circle.
C     REFMIRR is the reflectivity of the primary kaon light mirror.
C     D is the thickness of the radiator.
C     RADRAD is the radius of curvature of the upbeam and downbeam
C     faces of the radiator.
C     ZMAX is the maximum height of the mirror w.r.t. the radiator face.
C     ZMIN is the minimum height of the mirror w.r.t. the radiator face.
C     DIA  is the diameter of the photocathode (inches).
C     WID  is the radial width of the truncated Winston cones.
C     CYLEXT is the length of the cylindrical extension on cones.
C     ZFOC is the axial position of the focus w.r.t the radiator face.
C     ZWIN is the axial position of the mouth of the Winston cones.
C     EFFNCY is the photoefficiency of the phototubes.
C     REFLEC is the reflectivity of the surfaces of the Winston cones.
C     GAIN is the (relative) gain of the phototubes (approx. 1.0).
C     WIDCONE is the width of the mouth of the to-be-cutoff cone.
C     HCONE is the final height of the cut-off Winston cone.
C     N0 is the number of kaons to try.
      COMMON/RAN/ ISEED
```

685 MeV/c MIRROR

```
02/03/1999
11:42:15.21
Efficiencies convolved with beam momentum distribution.
  65537       14
     1.513     685.000      80.000      -3.900       3.900        .400
      .006        .005      61.330       4.400       8.275        .800
     1.000      80.000       5.336       3.042       1.800       1.600
     1.240      -2.084      -1.300        .200        .700        .760
     3.760       3.430
The number of kaons tried is:      999
The mean number of photons per kaon generated is     428.
PHOTONS TRAPPED IN WINSTON CORNERS      896
RAYS MISSING MIRROR,HIGH       19, LOW      573
PHOTONS ABSORBED AT REFLECTING SURFACES  178101
PHOTONS REFLECTED BY PHOTOTUBE GLASS    11204
PHOTONS COLLECTED PER KAON, CHN/10 PER BIN
      0       0       0      68     306     470     141       1       0       0
RADIAL POSITION AT FOCAL PLANE, 0.2 INCHES/BIN
      0       0       0       0      12    1100   12874   51424   86698  149000
  27652    6062     441       9       0       0       0       0       0       0
TANGENT OF ANGLE IN Z-PHI PLANE, 0.1/BIN
      0       0       0       0       0    3365   16525   27118   42345  156804
  42388   27249   16274    3204       0       0       0       0       0       0
RAYS MISSING WINSTON CONES    14089
RADIAL POSITION OF REJECTED RAYS, 0.2 INCHES/BIN
      0       0       0       0       0       0       0       0       0       0
      0       0       0       0       0       0       0       0       0       0
TAN OF ANGLE IN Z-PHI PLANE, REJECTED RAYS, 0.1/BIN
      0       0       0       0       0       0       0       0       0       0
      0       0       0       0       0       0       0       0       0       0
KAONS NOT DETECTED BY ANY PHOTOTUBES          0
KAONS DETECTED AT VOTER COINCIDENCE LEVEL 1 - 20
      0       0       0       0       0       0       0       0       2      10
     31     134     336     473       0       0       0       0       0       0
PULSE HEIGHT (1 PHOTOELECTRON/BIN) FOR EACH TUBE
  57 133 222 211 157  99  63  25  17   2   0   0   0   0   0   0   0   0   0
  50 120 226 207 172 107  58  32  11   2   1   0   0   0   0   0   0   0   0
  45 134 236 170 201  94  57  25  17   5   1   1   0   0   0   0   0   0   0
  50 147 219 199 184  90  60  19  12   3   2   0   1   0   0   0   0   0   0
  48 152 226 194 167 102  45  31  17   4   0   0   0   0   0   0   0   0   0
  57 133 218 210 136 117  66  26  15   7   0   1   0   0   0   0   0   0   0
  48 151 211 196 167 112  56  22  17   3   3   0   0   0   0   0   0   0   0
  58 148 214 212 133 110  67  25   9   5   4   1   0   0   0   0   0   0   0
  55 142 218 225 161  87  56  23  10   7   2   0   0   0   0   0   0   0   0
  55 140 213 219 142 113  57  25  14   5   3   0   0   0   0   0   0   0   0
  41 147 225 185 181 106  60  22  11   3   3   2   0   0   0   0   0   0   0
  55 135 206 218 146 121  68  19  11   5   2   0   0   0   0   0   0   0   0
  53 128 214 223 160 104  55  34  12   3   0   0   0   0   0   0   0   0   0
  57 149 203 208 160 116  52  25  10   5   1   0   0   0   0   0   0   0   0
 986   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 986   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 986   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 986   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 986   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 986   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
Elapsed execution time (seconds) is:    126.05
```

800 MeV/c MIRROR

```
02/04/1999
09:43:14.67
Efficiencies convolved with beam momentum distribution.
  65537       14
     1.513    800.000      80.000      -3.900       3.900        .400
      .006       .005      70.000       3.500       8.375        .800
     1.000     80.000       4.000       1.000       1.800       1.600
     1.240     -2.570      -1.300        .200        .700        .760
     3.760      3.430
The number of kaons tried is:      999
The mean number of photons per kaon generated is     504.
PHOTONS TRAPPED IN WINSTON CORNERS      820
RAYS MISSING MIRROR,HIGH        6, LOW      129
PHOTONS ABSORBED AT REFLECTING SURFACES  187345
PHOTONS REFLECTED BY PHOTOTUBE GLASS    12061
PHOTONS COLLECTED PER KAON, CHN/10 PER BIN
      0       0       0     134     384     452      16       0       0       0
RADIAL POSITION AT FOCAL PLANE, 0.2 INCHES/BIN
      0       0       0       0       0      69    2357   19766   59276  165911
  62243   37897   16752    4917    1201     174       0       0       0       0
TANGENT OF ANGLE IN Z-PHI PLANE, 0.1/BIN
      0       0       0       0       2    6086   18906   30812   48566  162789
  48091   30557   18804    5950       0       0       0       0       0       0
RAYS MISSING WINSTON CONES    24347
RADIAL POSITION OF REJECTED RAYS, 0.2 INCHES/BIN
      0       0       0       0       0       0       0       0       1       0
      0       0       0       0       0       0       0       0       0       0
TAN OF ANGLE IN Z-PHI PLANE, REJECTED RAYS, 0.1/BIN
      0       0       0       0       0       0       0       0       0       0
      0       0       0       1       0       0       0       0       0       0
KAONS NOT DETECTED BY ANY PHOTOTUBES          0
KAONS DETECTED AT VOTER COINCIDENCE LEVEL 1 - 20
      0       0       0       0       0       0       0       0       2       3
     23      95     291     572       0       0       0       0       0       0
PULSE HEIGHT (1 PHOTOELECTRON/BIN) FOR EACH TUBE
  31  97 161 219 180 148  78  40  21   5   3   3   0   0   0   0   0   0   0
  39 109 197 206 175 116  64  41  29   6   3   1   0   0   0   0   0   0   0
  42 121 177 201 183 136  58  44  16   5   3   0   0   0   0   0   0   0   0
  54 137 195 207 161 108  67  35  15   5   2   0   0   0   0   0   0   0   0
  49 116 185 192 193 121  67  35  16   5   5   2   0   0   0   0   0   0   0
  39 107 186 200 187 126  67  41  17  10   4   2   0   0   0   0   0   0   0
  40 119 158 191 177 139  83  42  21   9   3   4   0   0   0   0   0   0   0
  24 109 164 201 169 141 100  48  18   6   3   2   1   0   0   0   0   0   0
  30 123 177 188 185 137  81  35  23   5   1   1   0   0   0   0   0   0   0
  39 127 174 214 182 126  64  32  16   7   4   0   0   1   0   0   0   0   0
  45 110 186 204 180 117  88  38  12   5   1   0   0   0   0   0   0   0   0
  50 137 181 188 166 121  67  45  22   5   2   1   1   0   0   0   0   0   0
  35 128 164 203 167 140  75  34  27   6   5   2   0   0   0   0   0   0   0
  38 115 186 199 179 115  73  44  22  10   4   1   0   0   0   0   0   0   0
 986   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 986   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 986   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 986   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 986   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 986   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
Elapsed execution time (seconds) is:    138.09
```

```
      PROGRAM PICERENK
C     Modified 5/23/96 to use the stepping algorithm to follow
C     the photons in the radiator.
C     Modified 7/1/93 to include variation of index of refraction
C     with wavelength.
C     This version has a concave radiator to compensate for the
C     beam convergence.
C     Version to go with WINSTONP
C     This program is a MonteCarlo which traces the pion light
C     trapped in the radiator of Fitch-type kaon identifying
C     Cherenkov counter to an annular mirror and a ring of
C     phototubes equipped with Winston cones.
C     It expects to read the following data from file PICERENK.DAT
C     in format:   (Dimensions are in inches.)
C     2I5      ISEED, NPHOT
C     5F13.3   REFN, P, FOCD, XMIN, XMAX
C     6F13.3   SIGY, SIGXP, SIGYP, D, R1, REFMIRR
C     5F13.3   THEDGE, THMIRR, RPHOT, DIA, WID
C     6F13.3   CYLEXT, ZWIN, EFFNCY, RADRAD, REFLEC, GAIN
C     I5  N
C     ISEED is the seed for the random number generator.  It should
C     be a large odd number.
C     NPHOT is the number of phototubes in the circle.
C     REFN is the index of refraction of the radiator. (Not really
C     used, the index varies with wavelength.)
C     P is the kaon momentum in MeV/c.
C     FOCD is the distance from the radiator to the beam focus.
C     XMIN and XMAX are the edges of the beam, taken to be uniform.
C     SIGY is the sigma of the beam height, taken to be gaussian.
C     SIGXP is the sigma of the random horizontal beam spread.
C     SIGYP is the sigma of the vertical angular beam spread.
C     D is the thickness of the radiator.
C     R1 is the radius of the upstream face of the radiator.
C     REFMIRR is the reflectivity of the primary mirror.
C     THEDGE is the half apex angle of the conical radiator edge.
C     THMIRR is the half apex angle of the mirror tangent cone.
C     RPHOT is the radius of the phototube circle.
C     DIA  is the diameter of the photocathode (inches).
C     WID is the distance between the Winston truncation cylinders
C     (in inches).
C     CYLEXT is the length of the cylindrical extension on cones.
C     ZWIN is the axial position of the mouth of the Winston cone
C     w.r.t the radiator upstream face.
C     EFFNCY is the effective photoefficiency of the phototubes.
C     RADRAD is the radius of curvature of the faces of the radiator.
C     REFLEC is the reflectivity of the surfaces of the Winston cones.
C     GAIN is the variable equivalent to relative phototube gain.
C     N is the number of pions to try.
      COMMON/RAND/ ISEED
```

```
02/04/1999
09:52:51.78
  48953       14
       1.510       710.000        80.000        -3.900         3.900
        .400          .006          .005         1.000         4.875          .800
      39.510        21.470         6.165         1.800         1.500
        .900         -1.681          .200        80.000          .700          .505
The number of pions tried is      999
The mean number of photons per pion generated is     692.
STEPPING HANGUPS     1113
PHOTONS NOT REFRACTED FROM RADIATOR    51794
PHOTONS ABSORBED AT REFLECTING SURFACES  189026
PHOTONS STRIKING NON-ALUMINIZED BAND     7871
PHOTONS REFLECTED FROM PHOTOTUBE GLASS    12717
PHOTONS COLLECTED PER PION, CHN/10 PER BIN
      0         0        98       587       314         0         0         0         0         0
RADIAL POSITION AT FOCAL PLANE, 0.2 INCHES/BIN
      0         0         0         0         0      6299     34587     47700     55765    121848
  61489     59383     28429         0         0         0         0         0         0         0
TANGENT OF ANGLE IN Z-PHI PLANE, 0.1/BIN
   2898      2735      6014      9166     12973     18126     23737     30898     42560    117153
  42526     31178     23632     18249     12756      8947      6097      2885      1105      1865
PHOTONS MISSING WINSTON CONES    48676
RADIAL POSITION OF REJECTED PHOTONS, 0.2 INCHES/BIN
      0         0         0         0         0         0         0         0         0        46
    370       284        80         0         0         0         0         0         0         0
TAN OF ANGLE IN Z-PHI PLANE, REJECTED RAYS, 0.1/BIN
    287        63        16         4         0         1         0         0         0         0
      0         0         0         1         1         9        18        77        88       215
PIONS NOT DETECTED BY ANY PHOTOTUBES          0
PIONS DETECTED AT VOTER COINCIDENCE LEVEL 1 - 20
      0         0         0         0         0         0         0         1         8         9
     52       175       338       416         0         0         0         0         0         0
PULSE HEIGHT (1 PHOTOELECTRON/BIN) FOR EACH TUBE
  31  91 154 161 161 137  98  66  50  22   9  11   1   4   3   0   0   0   0
  29  92 160 170 153 135 117  73  41  14   7   1   4   2   1   0   0   0   0
  38 117 176 202 177 126  81  40  24  10   7   1   0   0   0   0   0   0   0
  72 169 165 169 145 139  76  32  19  10   2   1   0   0   0   0   0   0   0
  60 149 199 169 161 118  61  46  20   9   6   1   0   0   0   0   0   0   0
  43 112 193 184 169 123  88  48  20  16   2   1   0   0   0   0   0   0   0
  33  87 158 191 177 137  83  64  29  27   8   4   1   0   0   0   0   0   0
  29  85 148 177 201 137  83  69  31  25  10   1   1   2   0   0   0   0   0
  25  91 165 196 184 119  85  57  36  19  14   4   3   1   0   0   0   0   0
  36 110 162 223 175 120  83  49  29   8   4   0   0   0   0   0   0   0   0
  66 155 179 184 189  92  70  38  18   5   3   0   0   0   0   0   0   0   0
  66 153 197 176 162 116  62  35  20   9   2   1   0   0   0   0   0   0   0
  34 125 160 214 160 144  71  46  28  12   4   1   0   0   0   0   0   0   0
  25  84 160 188 175 127  98  55  42  18  16   5   4   1   0   1   0   0   0
 999   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 999   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 999   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 999   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 999   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 999   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
Elapsed execution time (seconds) is:    291.82
```

Points to tell P. K. etching about:

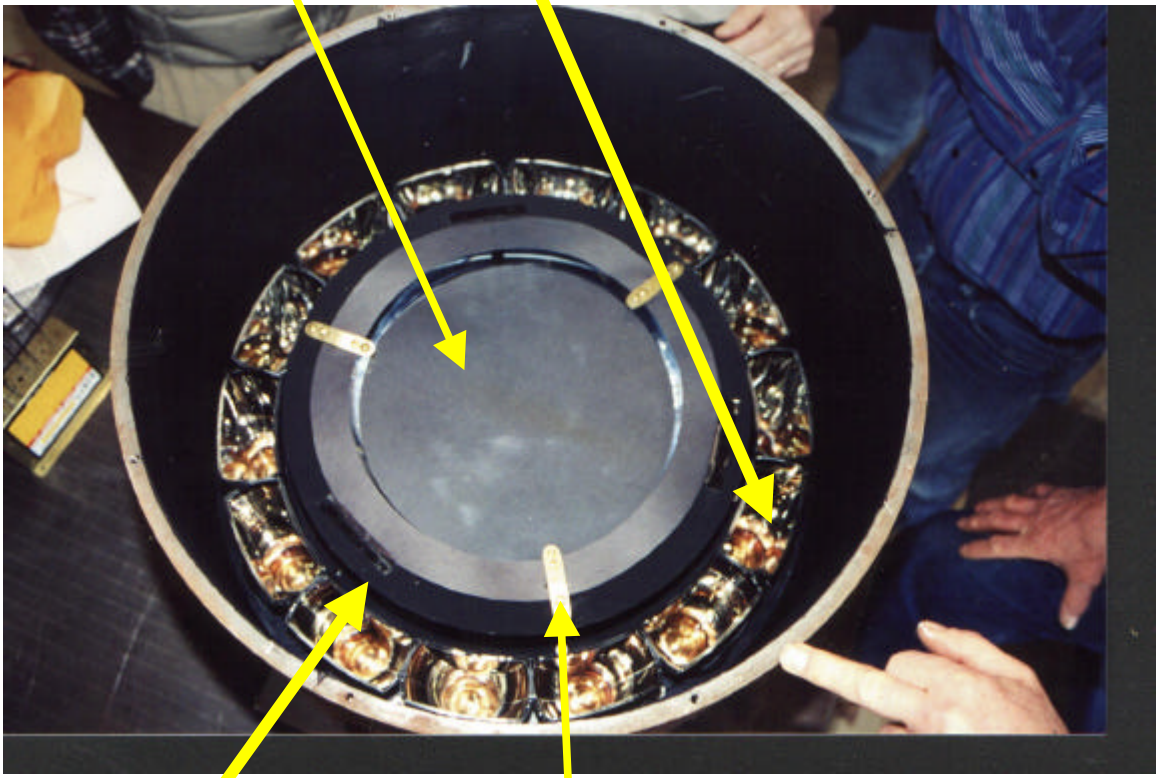
① Buses not light tight
② Foam rubber rings (tube)
③ " " " (cones)
④ mu-metal cans at -HV.
⑤ Winston cones at -HV
⑥ TL Winston cones - mylar between
⑦ Conical mirror tight fit over TL cones.
⑧ Aluminum radiator clearing buss mounting strips attached to radiator.
⑨ Spacers at each bolt for 200 MeV/c K mirror.

Professor Frank talking to the Student.

View of the Kaon Ring.

Lucite Radiator

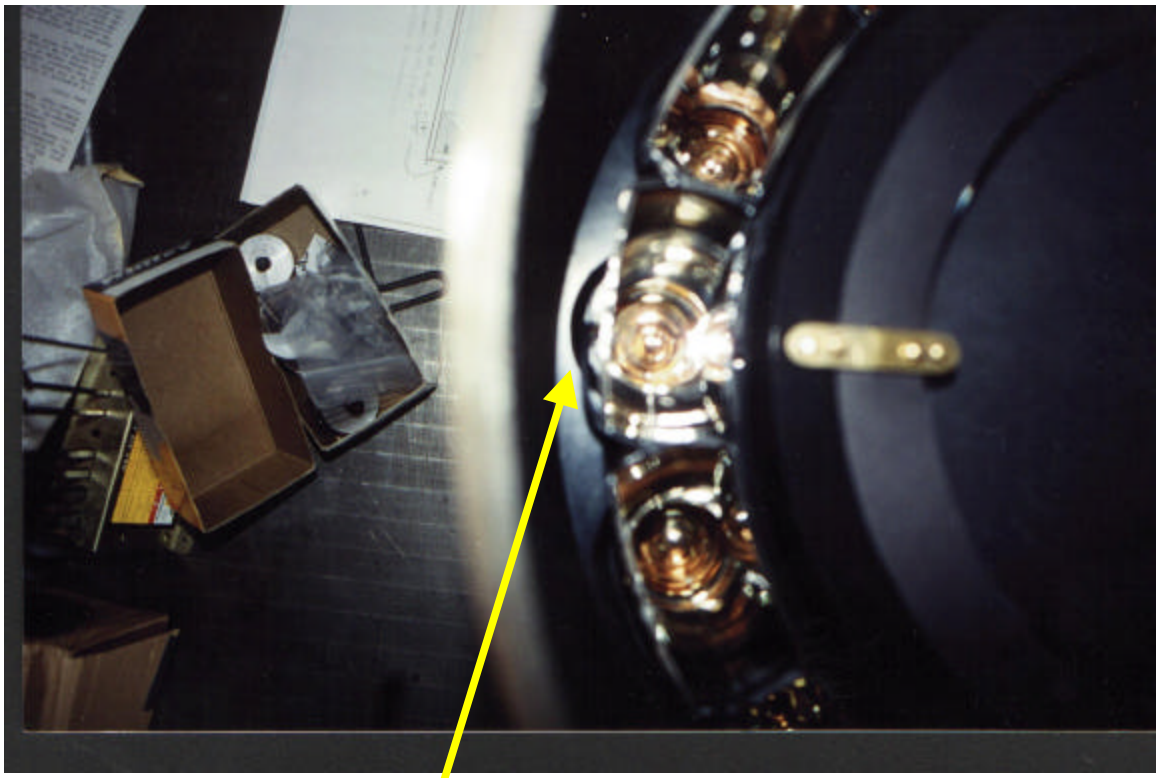
K Ring Winston Cone



Pion Ring mirror: Under it is the Pi Winston Cone and Pmt.

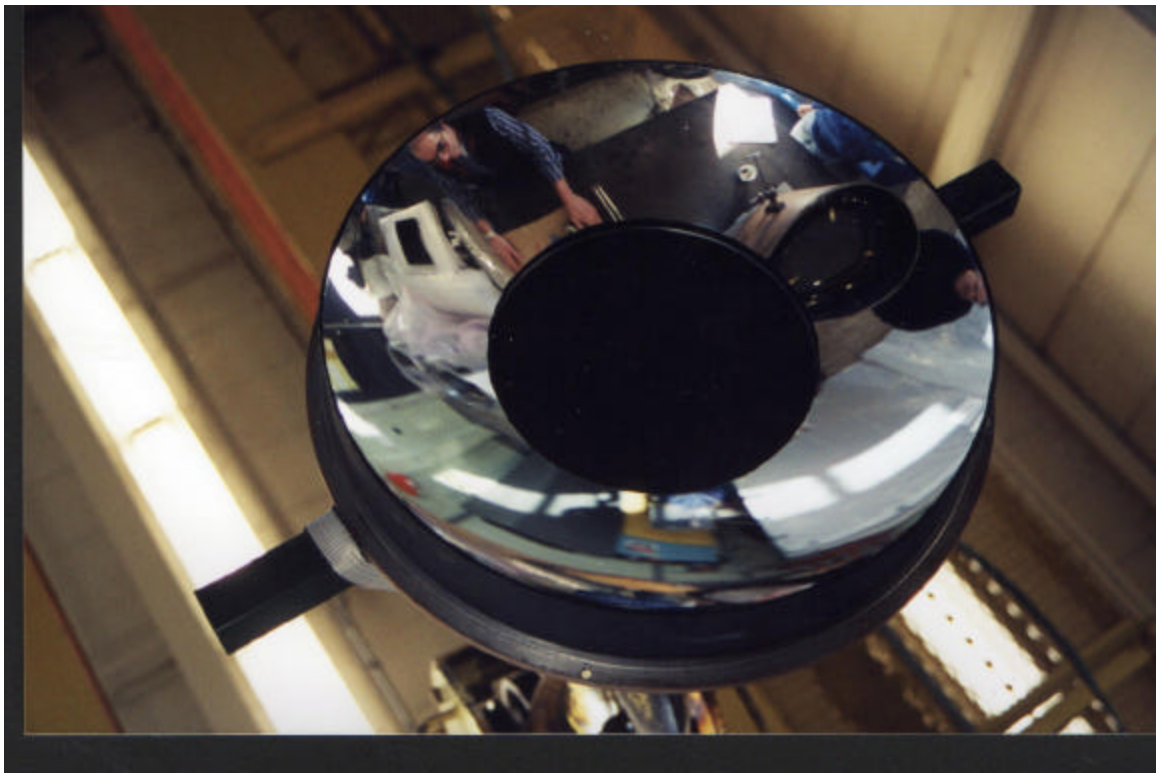
Support for the Radiator

Frank holding the Winston Cone he made. The cone is at the
tential of the Cathode.



Closeup view of the K ring Winston Cone. Noted the cable for
e High voltage connected to the Winston Cone.

Base tester, the base could not be removed from the counter. To
st the base, we had to remove the PMT and plug the externder into its
ace.

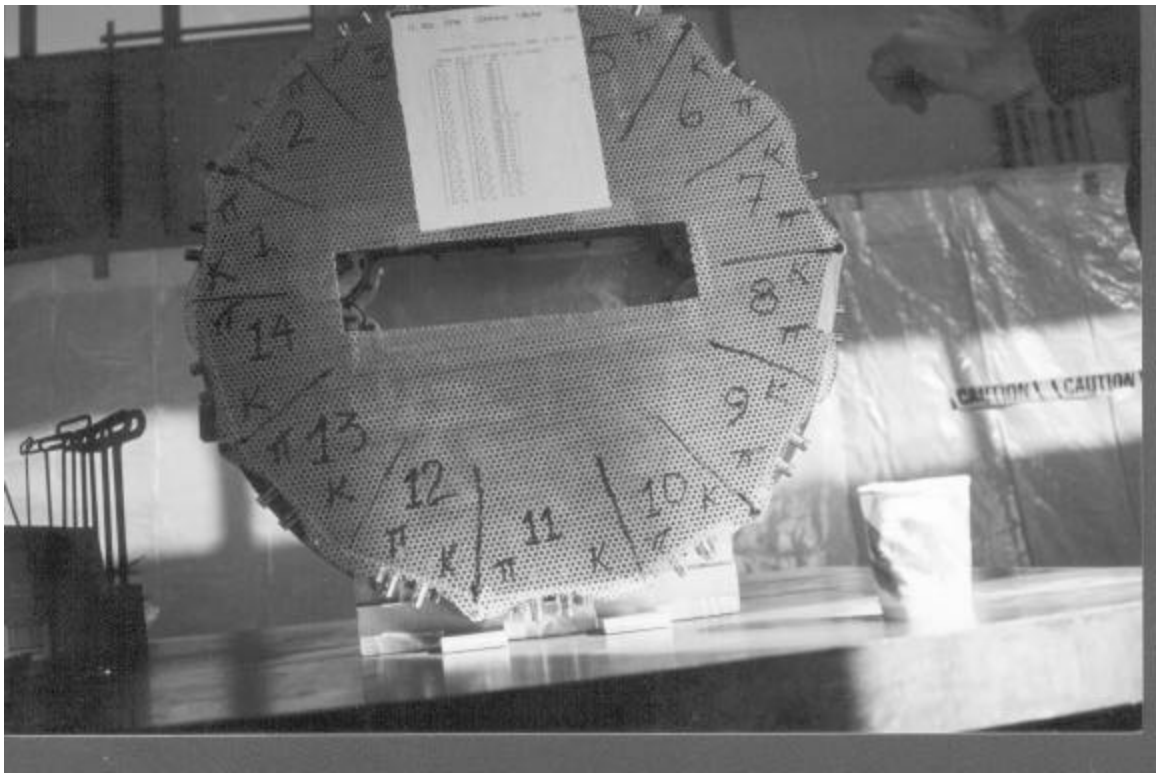


K mirror in the air: It was removed so we could access to all th
ner part of the Cerenkov counter.

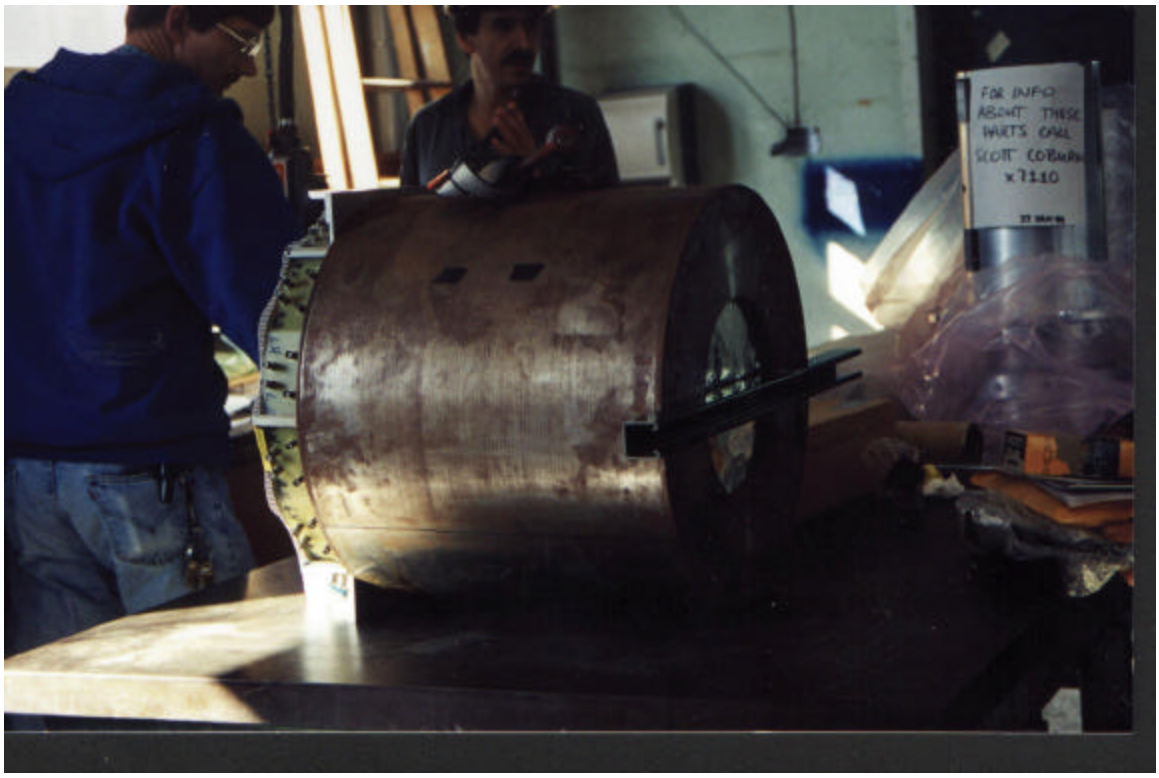
This support had to be installed before lifting the counter. The base is not strong enough to support the counter. When sit on the side, the down stream end is support by an block.

Tipping the counter before lifting.

An other view of tipping. Noted, there are two supports so the unter could sit with base face down.



Upstream View of the Cerenkov. Noted there are 14 pi and K be bases. They are build in place and had to be fixed in situ. Noted this le also had a support so the counter could sit on the side. We should tip e counter toward the down stream end.



The counter is sitting on the side. Noted the pair of k and pi bas
the same cubical. Counter is supported by Aluminum bracket on the bas
le and block on the other end.(could not see in the picture).