



**REPORT OF THE**  
**SUBATOMIC PHYSICS**  
**EXPERIMENTS EVALUATION COMMITTEE**  
**DECEMBER 12 & 13, 2008**

**TRIUMF  
SUBATOMIC PHYSICS  
EXPERIMENTS EVALUATION COMMITTEE MEETING  
DECEMBER 12 & 13, 2008  
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## 1. SUMMARY OF RECOMMENDATIONS

Progress Reports	6
New Proposals	18
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Number of Items for Committee Report	<u>26</u>

### RECOMMENDATIONS FOR PROPOSALS

High	1072, 1114, 1203, 1218
Medium-High	1103, 1107, 1127, 1183, 1200, 1201, 1204, 1207, 1212, 1213, 1216, 1220
Medium	1192, 1209, 1210, 1214, 1219
Deferred	1202
Not Approved	1215, 1217

### TOTAL NEW SHIFTS

						New Shifts
High	1072	1114	1203			743
Med-High	1103	1107	1127	1183	1201	≤118
	1213	1216	1220 → 1127			
Medium	1192	1209	1210	1214	1219	55
<b>TOTAL NEW SHIFTS</b>						<b>≤ 916</b>

## 2. SUMMARY OF ALLOCATIONS

Exp #	Title	Physics Priority	# Shifts
<b>4A. PROGRESS REPORTS</b>			
S1072	Study of the Decay $\pi \rightarrow e\nu$	H	270 & 450
S1103	( $\alpha$ ,p) Reactions in Type 1 X-ray Bursts: Time-Reversed Approach at ISAC-II	M-H	24
S1107	Nuclear Structure and Astrophysics Using (d,p) with n-rich Na Isotopes	M-H	20
S1114	Structure of neutron-rich Mg isotopes studied through $\beta$ -delayed $\gamma$ -decay of polarized Na isotopes	H	13
S1127	Search for Exotic Particle Emission in the Decay of Trapped Isomers	M-H	10
S1183	Test of Time Reversal Symmetry Using Polarized Unstable Nuclei	M-H	4
<b>4B. NEW PROPOSALS</b>			
S1192	Branching ratio and half-life measurement from the $\beta^+$ decay of $^{19}\text{Ne}$	M	14
S1200	Measuring the $^{26}\text{Al}(n,p)$ and $(n,\alpha)$ reactions	M-H	
S1201	Two-neutron transfer using the ( $^6\text{He}, ^4\text{He}$ ) reaction on $^9\text{Be}$ and $^{12}\text{C}$	M-H	16
S1202	Exploring Halo effects in the Scattering of $^{11}\text{Be}$ on Heavy Targets	D	
S1203	Spectroscopy of $^{12}\text{Li}$	H	10
S1204	Study of the $^{26g}\text{Al}(d, p) ^{27}\text{Al}^*$ transfer reaction in inverse kinematics: implications for the strengths of the key low energy astrophysical resonances in the $^{26g}\text{Al}(p, \gamma) ^{27}\text{Si}$ reaction	M-H	
S1207	Mirror Symmetry and Shape changes in $^{70}\text{Br}$ and $^{70}\text{Se}$ Studied in Coulomb Excitation Experiments at TRIUMF ISAC-II	M-H	

Exp #	Title	Physics Priority	# Shifts
S1209	Study of 3N forces in $^{10}\text{Be}$ through safe Coulomb-excitation measurements	M	8
S1210	$^{23}\text{Mg}+p$ inelastic scattering and the $^{23}\text{Mg}(p,\gamma)^{24}\text{Al}$ reaction rate	M	10
S1212	Deep inelastic reactions with TIGRESS and Bambino to study medium-high spin states in nuclei in and approaching the Island of Inversion	M-H	
S1213	$^{22}\text{Mg}$ structure controlling the $^{18}\text{Ne}(\alpha,p)^{21}\text{Na}$ Hot-CNO cycle breakout reaction - Studied in deuteron transfer using TIGRESS-SHARC at TRIUMF-ISAC II	M-H	18
S1214	Sub-barrier fusion of neutron rich nuclei and neutron transfer	M	3
S1215	Characterization of shape coexistence near $N = 40$	R	
S1216	A direct measurement of the $^{17}\text{O}(\alpha,\gamma)^{21}\text{Ne}$ cross section	M-H	22
S1217	E1 strengths in $^{9,11}\text{Be}$	R	
S1218	Towards an optical parity violation experiment in francium: Spectroscopy of the 7s - 8s transition	H	
S1219	The $^{12}\text{C} (^{16}\text{O},\gamma)^{28}\text{Si}$ radiative capture: structural and statistical aspects of the gamma decay	M	20
S1220	Search for non-exponential decay of $^{82}\text{Rb}$	MH	$\leq 4$

H = High; M-H = Medium-High; M = Medium; M-L = Medium-Low; L = Low;  
TBD = Shifts To Be Determined; D = Deferred; R = Rejected

### **3. INTRODUCTION**

The TRIUMF Subatomic Physics Experiments Evaluation Committee met Friday, Dec. 12, to Saturday, Dec. 13, 2008. The committee welcomed two new members, Prof. Jeff Blackmon (Louisiana State University) and Prof. Taka Otsuka (University of Tokyo).

The Subatomic Physics EEC considered 18 new proposals and 5 progress reports on previous submissions. Two of the presentations were given by video-link. The meeting started with a report on beam and target operations by the Beam Strategy Group. The committee congratulates the Beam Strategy Group and TRIUMF to the excellent progress on a number of projects and wants to thank the spokespersons for their hard work in preparing their presentations to the EEC.

The next meeting of the Subatomic Physics EEC has been tentatively scheduled for Thursday, July 9, to Friday, July 10, 2009.

#### 4A. RECOMMENDATIONS: PROGRESS REPORTS

<b>S1072</b>	<b>Study of the Decay <math>\pi \rightarrow e\nu</math></b>	<b>D.A. Bryman / T. Numao</b>
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The PIENU collaboration carried out a successful test of their apparatus during the past two months. They commissioned the extended beam line configuration and verified that the positron energy resolution, the low energy tail, and the background in the detector were at the proposal levels needed to make the measurement. The collaboration believes that they can make additional improvements but they are already set to meet their experimental goal.

The committee reiterates the statement made at the last EEC meeting for this effort: “The committee is pleased with the progress being made by the PIENU collaboration. . . All indications are that the project will be able to attain the goals set out in the original proposal. It continues to be a high priority physics experiment for TRIUMF.”

The EEC recommends that the shift allocation requested in the proposal be granted.

**PHYSICS PRIORITY:** high  
**STAGE:** 2  
**SHIFTS:** 270 from April to July 2009 & 450 from August to December 2009

<b>S1103</b>	<b>(<math>\alpha</math>,p) Reactions in Type 1 X-ray Bursts: Time-Reversed Approach at ISAC-II</b>	<b>M. Aliotta</b>
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The  $^{18}\text{Ne}(\alpha,p)^{21}\text{Na}$  reaction is a very important reaction for understanding X-ray bursts, providing a crucial link to the  $\alpha p$  process and heavier nuclei. Despite previous experimental work, substantial uncertainties in this important reaction rate remain. A good case was made that the proposed measurement of the  $^{21}\text{Na}(p,\alpha)^{18}\text{Ne}$  inverse reaction is now ready for Stage II approval. In addition, the measurement of  $^{21}\text{Na}+p$  inelastic scattering simultaneously with the  $(p,\alpha)$  reaction in this experiment and in the separate experiment S1105 (Jenkins, Austin, Woods et al.) seem posed to provide the information on excited state contributions that will not be determined in the  $(p,\alpha)$  inverse reaction channel. The committee is somewhat concerned that the energy range covered will not reach low enough in excitation energy, and recommends that a focus should be on the lowest energy regime possible.

**PHYSICS PRIORITY:** medium-high  
**STAGE:** 2  
**SHIFTS:** 24

<b>S1107</b>	<b>Nuclear Structure and Astrophysics Using (d,p) with n-rich Na Isotopes</b>	<b>W. Catford</b>
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The committee recommends that this proposal be granted Stage 2 approval.

**PHYSICS PRIORITY:** medium-high  
**STAGE:** 2  
**SHIFTS:** 20

<b>S1114</b>	<b>Structure of neutron-rich Mg isotopes studied through <math>\beta</math>-delayed <math>\gamma</math>-decay of polarized Na isotopes</b>	<b>T. Shimoda</b>
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The nuclear structure in the region near  $^{32}\text{Mg}$  is very important as a testing ground for models, but has been hampered by lack of detailed spectroscopy and knowledge of level schemes. The committee is impressed with the results for spin-parities of excited states obtained thus far for  $^{28}\text{Mg}$  and  $^{29}\text{Mg}$  using the unique technique of measuring asymmetries for spin-polarized beta-delayed gamma decay. The study of levels in  $^{30}\text{Mg}$ , and the measurement of level spins, requires additional time beyond the 7 shifts that remain in the initial allocation for this experiment. The committee was convinced that results could be obtained with an additional allocation of 6 shifts for the study of  $^{30}\text{Na}$  decay to  $^{30}\text{Mg}$ .

The studies of  $^{31}\text{Mg}$  and  $^{32}\text{Mg}$  will require the additional intensity of neutron-rich beams produced by an actinide target. The committee looks forward to receiving a further request for these measurements once sufficient yields of these isotopes has been demonstrated.

**PHYSICS PRIORITY:** high  
**STAGE:** 2  
**SHIFTS:** 13

<b>S1127</b>	<b>Search for Exotic Particle Emission in the Decay of Trapped Isomers</b>	<b>J.A. Behr</b>
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The proponents have made good use of the 6 shifts of beam time delivered last summer. They have identified the laser ionization scheme for neutral  $^{86\text{m}}\text{Rb}$  atoms leaving the trap and showed that the background level between the gamma-ray recoils and the zero momentum ions ionized in the trap would allow them to have a sensitivity to search for exotic particle at the  $10^{-6}$  branching ratio level relative to the gamma-ray recoils. This is quite competitive with other methods. The experiment is also the thesis project of a UBC graduate student.

The beam is available.

Stage 2 approval is granted with an allocation of 10 shifts at Medium High priority.

**PHYSICS PRIORITY:** medium-high  
**STAGE:** 2  
**SHIFTS:** 10

<b>S1183</b>	<b>Test of Time Reversal Symmetry Using Polarized Unstable Nuclei</b>	<b>J. Murata</b>
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Proposal S1183 requests stage two approval for an experiment to measure the R correlation parameter in  ${}^8\text{Li}$  beta decay. The original proposal for the experiment was granted stage 1 approval in July, 2008. The group who plan to carry out this experiment have now completed their detector tests at KEK. All indications are that the detector system is operating as expected. The main concern of the committee is the slow DAQ system, which will limit the rate at which data can be taken. Substantially more  ${}^8\text{Li}$  beam will be available than can be used with the present limitations. This is a particular problem since the polarization of the beam will likely be lower than the requested 80%. If the polarization averaged 70% rather than 80%, nearly the same sensitivity to R could be obtained by a 20% increase in the data taking rate. We urge the group to work on this. They should consider consulting with groups at TRIUMF who have worked very hard on similar DAQ problems.

In order to carry out the measurement, equipment will need to be moved from Japan to the Canada and set up at ISAC. The committee recommends that the experiment be granted stage 2 approval and that the group proceeds with their plans to move the experiment to TRIUMF. Beam time for test runs should be granted to the group once they have demonstrated that they are ready to carry out the experiment at TRIUMF with the apparatus in place and working. Following the test runs, we recommend that the scientific director carry out an informal review of the group's progress before scheduling the full compliment of shifts.

**PHYSICS PRIORITY:** medium-high  
**STAGE:** 2  
**SHIFTS:** 4

## 4B. RECOMMENDATIONS: NEW PROPOSALS

<b>S1192</b>	<b>Branching ratio and half-life measurement from the <math>\beta^+</math> decay of <math>^{19}\text{Ne}</math></b>	<b>S. Triambak</b>
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The proposed measurement of the half-life and branching ratio of  $^{19}\text{Ne}$  is interesting and the experiment is straightforward. However, after comparing S1192 with the approved experiments for  $^{10}\text{C}$  and  $^{14}\text{O}$ , the committee felt that the scientific case is not as strong and did not see a clear demonstration of the impact on right-handed and scalar interactions for the  $^{19}\text{Ne}$  case. While the experiment should be carried out, the committee did not see an urgency. Therefore, we recommend stage 1 and 2 approval with medium priority.

**PHYSICS PRIORITY:** medium  
**STAGE:** 1 & 2  
**SHIFTS:** 14

<b>S1200</b>	<b>Measuring the <math>^{26}\text{Al}(n,p)</math> and <math>(n,\alpha)</math> reactions</b>	<b>A. Couture / C. Ruiz / L. Buchmann</b>
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This proposal seeks to produce a  $^{26}\text{Al}$  target to be used for  $(n,p)$  and  $(n,\alpha)$  reactions at the LANL Lujan Center. The science is strongly motivated in that it is vital to know the neutron destruction cross section of  $^{26}\text{Al}$  in order to put the observed  $^{26}\text{Al}$  galactic abundances into a proper context. The committee is convinced that the proposed measurements are very important, and is pleased that this experiment will be led by TRIUMF personnel.

There are a number of issues that will need further clarification before stage 2 approval can be granted to this request. The detailed requirements of the target, especially the required size of the target holder with respect to the size of the neutron beam on FP5, the ability to extract signals from the detectors to be used in the presence of the gamma flash associated with neutron production, the acceptance of this experiment by the LANSCE PAC, etc. The proponents are strongly urged to address these issues before seeking Stage 2 approval.

**PHYSICS PRIORITY:** medium-high  
**STAGE:** 1  
**SHIFTS:** -

<b>S1201</b>	<b>Two-neutron transfer using the <math>(^6\text{He}, ^4\text{He})</math> reaction on <math>^9\text{Be}</math> and <math>^{12}\text{C}</math></b>	<b>F. Sarazin</b>
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This experiment proposes to explore the use of the  $(^6\text{He}, ^4\text{He})$  reaction for studying pair transfer reactions, as a replacement of the presently impossible  $(t,p)$  reaction. The proposal consists of two parts. The first part is a measurement of the angular distribution of the  $^{12}\text{C}(^6\text{He}, ^4\text{He})^{14}\text{C}$  reaction as a calibration in comparison to the existing  $(t,p)$  data. This part is recommended with medium-high priority. The second part is the  $^9\text{Be}(^6\text{He}, ^4\text{He})^{11}\text{Be}$  reaction, particularly leading to the state at 8.82

MeV. While this experiment is interesting, this part is deferred until a more precise assessment can be made after the first measurement is carried out.

**PHYSICS PRIORITY:** medium-high  
**STAGE:** 2  
**SHIFTS:** 16

<b>S1202</b>	<b>Exploring Halo effects in the Scattering of <math>^{11}\text{Be}</math> on Heavy Targets</b>	<b>I. Martel / J.J. Gomez-Camacho / M.J.G. Borge / O. Tengblad</b>
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Experiment 1202 aims to study the effect of the one neutron halo in  $^{11}\text{Be}$  on nuclear reaction mechanisms via measurement of  $^{11}\text{Be}+^{208}\text{Pb}$  elastic scattering, Coulomb excitation, and reaction cross sections. The B(E1) transition strength in  $^{11}\text{Be}$  has been measured by Coulomb excitation at medium energies and through a lifetime measurement by the Doppler Shift Attenuation. The measured values are consistent and large, likely indicating a strong dipole polarizability. The current proposed measurement also builds upon recent work by the same group that has studied the effect of the neutron halo in  $^{11}\text{Li}$  on similar reaction mechanisms.

While further measurements to investigate how the neutron halo and dipole polarizability are manifested in reaction mechanisms with  $^{11}\text{Be}$  may be of interest, the analysis of the recent  $^{11}\text{Li}$  data by the group is not yet complete. Thus it is difficult to gauge at this time what impact measurements with  $^{11}\text{Be}$  will have beyond what will be learned from the  $^{11}\text{Li}$  (or  $^6\text{He}$ ) results. Therefore, the EEC defers making a recommendation on this proposal until the analysis on  $^{11}\text{Li}$  is mature, and a clear case can be presented as to how measurements with  $^{11}\text{Be}$  will expand our understanding of nuclear reaction mechanisms.

**PHYSICS PRIORITY:** -  
**STAGE:** -  
**SHIFTS:** -

<b>S1203</b>	<b>Spectroscopy of <math>^{12}\text{Li}</math></b>	<b>H. Al Falou / R. Kanungo</b>
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This proposal is for an experiment to study the spectroscopy of  $^{12}\text{Li}$ . The committee appreciates that very little is known about  $^{12}\text{Li}$ , which is just outside the drip line. The resonance structure will be explored in this experiment by using  $^{11}\text{Li}(d,p)^{12}\text{Li}$  reaction. The advantage of the high intensity  $^{11}\text{Li}$  beam at TRIUMF is utilized. As this is one of the very early experiments on  $^{12}\text{Li}$ , the results are very intriguing. The committee recommends that this experiment be granted Stage 2 approval at high priority, and encourages the collaboration to make an additional request/proposal for more shifts if a resonance is observed.

**PHYSICS PRIORITY:** high  
**STAGE:** 2  
**SHIFTS:** 10

<b>S1204</b>	<b>Study of the <math>^{26g}\text{Al}(\text{d}, \text{p})^{27}\text{Al}^*</math> transfer reaction in inverse kinematics: implications for the strengths of the key low energy astrophysical resonances in the <math>^{26g}\text{Al}(\text{p}, \gamma)^{27}\text{Si}</math> reaction</b>	<b>G. Lotay</b>
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The proposal to explore excited states in  $^{27}\text{Al}$  seemed to be well motivated scientifically through its potential impact on the knowledge of resonance strengths in the astrophysically important  $^{26}\text{Al}(\text{p}, \gamma)^{27}\text{Si}$  reaction.

The committee questions however the approach of measuring this neutron transfer in inverse kinematics with the radioactive beam at TRIUMF. Before stage II approval can be granted the collaboration should explain what advantage this experiment would have compared to already proposed/approved measurements in normal kinematics with an implanted Al foil target and a deuteron (or  $^3\text{He}$ , with direct access to the states of interest) beam.

**PHYSICS PRIORITY:** medium-high  
**STAGE:** 1  
**SHIFTS:** -

<b>S1207</b>	<b>Mirror Symmetry and Shape changes in <math>^{70}\text{Br}</math> and <math>^{70}\text{Se}</math> Studied in Coulomb Excitation Experiments at TRIUMF ISAC-II</b>	<b>C. Andreoiu / R. Wadsworth</b>
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This is a proposal to do Coulomb excitation experiments on  $^{70}\text{Br}$  and  $^{70}\text{Se}$ . The T=1 isospin triplet should have the same shape. But isospin symmetry breaking may change this situation. By multiple Coulomb excitation, the quadrupole moment of the  $2^+$  state and other quantities are to be measured. This experiment will produce new data with new insight of the interplay of the nuclear force and Coulomb force. The results should be of considerable interest. The committee recommends that the proposal be granted Stage 1 approval at medium-high priority.

**PHYSICS PRIORITY:** medium-high  
**STAGE:** 1  
**SHIFTS:** -

<b>S1209</b>	<b>Study of 3N forces in <math>^{10}\text{Be}</math> through safe Coulomb-excitation measurements</b>	<b>J.N. Orce</b>
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The committee welcomes ideas to constrain three-nucleon interactions with new measurements in light nuclei and encourages proposals that provide crucial tests/inputs for ab-initio theories. This can have a significant impact, due to advances in the theory of nuclear forces combined with computational few- and many-body advances.

The committee felt that a stronger motivation could have been made for proposal S1209 and the importance of the measurements in this light nucleus. Several other experiments have been carried out

or are being planned to obtain this information. Indeed, a recent life-time measurement at ANL should be published soon. This should give a measurement of comparable precision to the proposed B(E2) measurement in  $^{10}\text{Be}$  and will be a good test of the validity of the two techniques.

The committee recommends Stage 2 approval for this experiment.

**PHYSICS PRIORITY:** medium  
**STAGE:** 2  
**SHIFTS:** 8

<b>S1210</b>	<b><math>^{23}\text{Mg}+p</math> inelastic scattering and the <math>^{23}\text{Mg}(p,\gamma)^{24}\text{Al}</math> reaction rate</b>	<b>J. Blackmon / M. Matos</b>
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The  $^{23}\text{Mg}(p,\gamma)^{24}\text{Al}$  rate is important in explosive stellar environments. This proposal's technique of inelastic proton scattering can provide information on  $^{24}\text{Al}$  resonance states. Unfortunately, the proposal is unlikely to be sensitive to the most interesting low energy states. This reduces its direct importance for astrophysics.

The committee recommends that this proposal be granted Stage 2 approval.

**PHYSICS PRIORITY:** medium  
**STAGE:** 2  
**SHIFTS:** 10

<b>S1212</b>	<b>Deep inelastic reactions with TIGRESS and Bambino to study medium-high spin states in nuclei in and approaching the Island of Inversion</b>	<b>S. Williams</b>
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Proposal 1212 seeks to study medium-high spin states in nuclei approaching the island of inversion for  $Z\sim 11$ ,  $N\sim 16$ , using deep-inelastic transfer following reactions of  $^{24,26}\text{Na}$  on  $^{208}\text{Pb}$ . The committee is concerned that the technique proposed would not allow the assignment of spins (and parities) to the states observed. Also, the strongest channels are 1 and 2 nucleon transfer which are strongly coupled to the incident channel, and there is a question as to the efficacy of using weak radioactive beams as compared to intense (but less neutron-rich) stable beams to populate these nuclei. Nevertheless, the committee feels that the technique has the potential to delineate the region where shell structure is re-ordered.

The committee grants Stage 1 approval to this proposal. In a follow-up request for Stage 2 approval, the committee asks that the collaboration provides answers to the concerns noted above.

**PHYSICS PRIORITY:** medium-high  
**STAGE:** 1  
**SHIFTS:** -

<b>S1213</b>	<b><math>^{22}\text{Mg}</math> structure controlling the <math>^{18}\text{Ne}(\alpha,p)^{21}\text{Na}</math> Hot-CNO cycle breakout reaction - Studied in deuteron transfer using TIGRESS-SHARC at TRIUMF-ISAC II</b>	<b>C.A. Diget / J. Blackmon</b>
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The committee viewed this proposal for a survey of the  $^{22}\text{Mg}$  excited state structure relevant to the astrophysically important  $^{18}\text{Ne}(\alpha,p)^{21}\text{Na}$  reaction as well motivated and feasible.

Specifically the proton branching ratios and possible identification of low spin states via  $\alpha$ -p coincident angular distributions will be important for interpretation of the reverse reaction approach  $^{21}\text{Na}(p,\alpha)^{18}\text{Ne}$ . Additionally, extracted alpha-widths at higher energies should be compared to previous direct experiments.

**PHYSICS PRIORITY:** medium-high  
**STAGE:** 2  
**SHIFTS:** 18

<b>S1214</b>	<b>Sub-barrier fusion of neutron rich nuclei and neutron transfer</b>	<b>A. Shotter / C. Ruiz</b>
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This proposal presents an interesting strategy to isolate the effects, on subbarrier fusion, of changes in the Q value for neutron transfer. Furthermore if successful, the choice of many Li and Sn isotopes offers future possibilities. However, the committee has some questions regarding the  $^{123}\text{I}$  activation method. We recommend the  $^6\text{Li}$  measurement be done first to understand the foil activation. In addition, one should consider counting  $^{124}\text{I}$ , if possible, in addition to  $^{123}\text{I}$  since the  $^{123}\text{I}/^{124}\text{I}$  ratio may change with energy.

The committee recommends the  $^6\text{Li}$  beam request for Stage 2 approval and allocates 3 shifts for it. The request for  $^8\text{Li}$  beam is granted Stage 1 approval. Stage 2 approval should be requested following the completion of the stable beam experiment.

**PHYSICS PRIORITY:** medium  
**STAGE:** 2 for  $^6\text{Li}$  & 1 for  $^8\text{Li}$   
**SHIFTS:** 3 for  $^6\text{Li}$  & 0 for  $^8\text{Li}$

<b>S1215</b>	<b>Characterization of shape coexistence near N = 40</b>	<b>W.D. Kulp</b>
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The main thrust of proposal S1215 seeks to identify E0 strengths between spin 2 states and between spin 4 states in  $^{76,78}\text{Kr}$ . This would provide information on the mixing between shape-coexisting states of different intrinsic deformation and the degree of K-mixing. The experimental technique relies upon measuring an enhancement of the K conversion coefficient over that expected for a pure  $\gamma$ -ray transition. The expected value of this enhancement is  $\sim 5\%$ , compared to an experimental uncertainty of  $\sim 3\%$ . The committee felt that this would not give a statistically significant measurement of the E0 strength, and a convincing case had not been made to justify the beam-time request. Nevertheless, the

proposers are encouraged to find a more optimum case where this interesting technique could be employed.

**PHYSICS PRIORITY:** -  
**STAGE:** -  
**SHIFTS:** -

<b>S1216</b>	<b>A direct measurement of the <math>^{17}\text{O}(\alpha,\gamma)^{21}\text{Ne}</math> cross section</b>	<b>A.M. Laird</b>
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Experiment 1216 proposes to perform the first measurement of the  $^{17}\text{O}(\alpha,\gamma)^{21}\text{Ne}$  reaction cross section. Estimates for this reaction vary substantially, by over 3 orders of magnitude. If the reaction cross section is near the upper end of the estimated range, it may compete to some level with the  $^{17}\text{O}(\alpha,n)^{20}\text{Ne}$  reaction and have a significant influence on nucleosynthesis in the weak s process. There is a compelling scientific case, and the DRAGON facility seems to be well suited to the proposed measurement.

The proposed energy range of the measurement (1.5-2.0 MeV) is substantially above the energy range of astrophysical interest. The committee feels that it will be difficult to draw significant conclusions about the astrophysical energy range from measurements above 1.5 MeV. While there are issues with acceptance of DRAGON, the committee none-the-less feels that measurements pushing to as low an energy range as possible are desired. The beam time request for this proposal is also based upon achieving high statistics (~1000 counts) in the higher energy regime for the smallest cross section estimates. This seems unwarranted given that the reaction is unmeasured, and the discrepancy between models is so large. If the cross section is near the lower end of the expected range, this is not warranted as the  $(\alpha,n)$  reaction becomes so dominant. The committee recommends approval for the requested number of shifts with the caveat that the beam time be directed towards less precise measurements that push as low in energy as possible.

**PHYSICS PRIORITY:** medium-high  
**STAGE:** 2  
**SHIFTS:** 22

<b>S1217</b>	<b>E1 strengths in <math>^9,^{11}\text{Be}</math></b>	<b>C.Y. Wu</b>
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The committee recognizes the importance of the measurement of observables in light nuclei in order to provide stringent tests of ab-initio many-body theories. In this context the accurate determination of transition strengths is required in order to complement existing information on energy levels.

Proposal S1217 seeks to measure B(E1) strengths in  $^9\text{Be}$  and  $^{11}\text{Be}$  using Coulomb excitation in order to provide an accurate data set for comparison with NCSM and NCSM/RGM calculations. Unfortunately, the sub-Coulomb technique suffers from uncertainty in the treatment of nuclear interference and the effect of coupling to unbound states. In the worst case this will give doubt as to the reliability of the results, and in the best case will give an uncertainty which would not improve upon the existing data.

The committee's view is that the proposed measurements in  $^{11}\text{Be}$  would not significantly improve the accuracy of the data deduced from the existing lifetime measurement and the 3 sets of intermediate energy Coulex measurements. In the case of  $^9\text{Be}$  the committee is not convinced that the knowledge on the B(E1) can be significantly improved such as to make a major impact on the  $(\alpha,\alpha,n)$  astrophysical reaction rate.

Regrettably, the committee felt compelled to reject this proposal. It does however encourage the proposers to find cases of greater scientific impact where this technique could be employed.

**PHYSICS PRIORITY:** -  
**STAGE:** -  
**SHIFTS:** -

<b>S1218</b>	<b>Towards an optical parity violation experiment in francium: Spectroscopy of the 7s - 8s transition</b>	<b>G. Gwinner</b>
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This program of atomic PNC in Fr has fundamental aims: the measurement of the Fr weak charge could be one of the best low energy tests of the Standard Model and the anapole moment measurements could provide crucial information on hadronic weak interactions. We note that the recent improvement in atomic PNC theory for Cs supports the development of the necessary Fr atomic theory. The timely completion of these difficult measurements will benefit greatly from a second ISAC beam line. The proposed observation of the highly forbidden 7s-8s transition is a useful first step.

The committee recommends Stage one approval at high priority.

**PHYSICS PRIORITY:** high  
**STAGE:** 1  
**SHIFTS:** -

<b>S1219</b>	<b>The <math>^{12}\text{C} (^{16}\text{O},\gamma) ^{28}\text{Si}</math> radiative capture: structural and statistical aspects of the gamma decay</b>	<b>S. Courtin</b>
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This group has made excellent progress in their work on the radiative capture reaction  $^{12}\text{C}+^{16}\text{O}$  at energies above the coulomb barrier, and they have demonstrated that they understand their data very well. The present proposal will extend the radiative capture process to lower energies, below the Coulomb barrier, which will result in less angular momentum being available for the capture state. Thus, the most likely resonances observed will be the natural parity  $0^+$ ,  $1^-$ ,  $2^+$ , and  $3^-$  states. This is the most favourable range for population of the long-sought low-spin states of the molecular prolate bands. Furthermore, the new data should shed new light on the role of structure in the heavy-ion radiative capture process. The committee considers this a worthy goal, and therefore grants Stage 2 approval at Medium priority with an allocation of 20 shifts to complete the measurement.

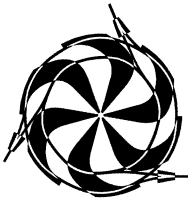
**PHYSICS PRIORITY:** medium  
**STAGE:** 2  
**SHIFTS:** 20

<b>S1220</b>	<b>Search for non-exponential decay of <math>^{82}\text{Rb}</math></b>	<b>J.A. Behr</b>
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Proposal S1220 requests stage two approval for an experiment to measure the time dependence of  $^{82}\text{Rb}$  electron capture (EC) rate. The experiment would be carried out at TRINAT. The goal of the experiment is to look for a modulation in the EC rate similar to that found for EC decays in  $^{140,142}\text{Pr}$  and  $^{122}\text{I}$ . These three nuclei have been measured by the GSI group using the storage ring there. This phenomenon has not been observed in other beta-decay and EC studies.

The committee considers this request to fall under the same category—highly speculative—as the search for low mass exotic particles. It appears that a few shifts of beam time would be sufficient to determine if an oscillatory signal were present. Consequently, the committee recommends that the Scientific Director, in consultation with the PI, add up to 4 shifts of time to experiment S1127 when it is scheduled if the situation with the GSI experiments is still unclear. If an oscillatory signal were found in the TRINAT data, it would be *extremely* interesting and clearly would warrant additional time being devoted to this effort at the highest priority.

**PHYSICS PRIORITY:** MH  
**STAGE:** 2  
**SHIFTS:** up to 4 shifts added to experiment S1127 at the discretion of the Scientific Director

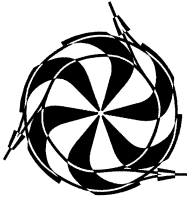


**TRIUMF  
SUBATOMIC PHYSICS  
EXPERIMENTS EVALUATION COMMITTEE MEETING  
DECEMBER 12 & 13 2008  
IN THE TRIUMF AUDITORIUM  
AGENDA**

**FRIDAY DECEMBER 12<sup>th</sup>, 2008**

(New proposals are identified by the asterisk.)

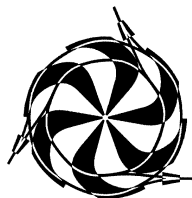
Time	Exp. #	Title	Spokesperson
<b>12:00</b>		<b>Lunch – Inside the MOB Boardroom CLOSED MEETING</b>	
12:40		Beam Strategy Group	G. Ball
13:00	S1192*	Branching ratio and half-life measurement from the $\beta^+$ decay of $^{19}\text{Ne}$	S. Triambak
13:25	S1207*	Mirror Symmetry and Shape changes in $^{70}\text{Br}$ and $^{70}\text{Se}$ Studied in Coulomb Excitation Experiments at TRIUMF ISAC-II	C. Andreoiu
13:50	S1214*	Sub-barrier fusion of neutron rich nuclei and neutron transfer	A. Shotter
14:15	S1201*	Two-neutron transfer using the ( $^6\text{He}, ^4\text{He}$ ) reaction on $^9\text{Be}$ and $^{12}\text{C}$	G. Hackman
14:40	S1203*	Spectroscopy of $^{12}\text{Li}$	H. Al Falou
<b>15:05</b>		<b>Coffee – Auditorium</b>	
15:25	S1072	Study of the Decay $\pi \rightarrow e\nu$	L. Doria
15:40	S1127	Search for Exotic Particle Emission in the Decay of Trapped Isomers	J.A. Behr
15:55	S1183	Test of Time Reversal Symmetry Using Polarized Unstable Nuclei	J. Murata
16:10	S1220*	Search for non-exponential decay of $^{82}\text{Rb}$	J.A. Behr
16:35	S1218*	Towards an optical parity violation experiment in francium: Spectroscopy of the 7s - 8s transition	G. Gwinner
<b>17:00</b>		<b>In-Camera Meeting – Inside the MOB Boardroom with coffee and snacks</b>	



**TRIUMF**  
**SUBATOMIC PHYSICS**  
**EXPERIMENTS EVALUATION COMMITTEE MEETING**  
**DECEMBER 12 & 13 2008**  
**IN THE TRIUMF AUDITORIUM**  
**AGENDA**

**SATURDAY, DECEMBER 13<sup>th</sup>, 2008**

Time	Exp. #	Title	Spokesperson
<b>07:30</b>		<b>Breakfast – Inside the Hot Spot Café (cafeteria)</b>	
<b>08:00</b>		<b>CLOSED MEETING</b>	
08:30	S1202*	Exploring Halo effects in the Scattering of $^{11}\text{Be}$ on Heavy Targets	J.J. Gomez-Camacho (Vid. Conf.)
08:55	S1217*	E1 strengths in $^9,^{11}\text{Be}$	C.Y. Wu
09:20	S1209*	Study of 3N forces in $^{10}\text{Be}$ through safe Coulomb-excitation measurements	J.N. Orce
09:45	S1219*	The $^{12}\text{C} (^{16}\text{O},\gamma) ^{28}\text{Si}$ radiative capture: structural and statistical aspects of the gamma decay	S. Courtin (Vid. Conf.)
10:10	S1103	$(\alpha,p)$ Reactions in Type 1 X-ray Bursts: Time-Reversed Approach at ISAC-II	T. Davinson
<b>10:25</b>		<b>Coffee – Auditorium</b>	
10:45	S1215*	Characterization of shape coexistence near $N = 40$	W.D. Kulp
11:10	S1114	Structure of neutron-rich Mg isotopes studied through $\beta$ -delayed $\gamma$ -decay of polarized Na isotopes	T. Shimoda
11:25	S1212*	Deep inelastic reactions with TIGRESS and Bambino to study medium-high spin states in nuclei in and approaching the Island of Inversion	S. Williams
11:50	S1210*	$^{23}\text{Mg}+p$ inelastic scattering and the $^{23}\text{Mg}(p,\gamma)^{24}\text{Al}$ reaction rate	J. Blackmon
12:15	S1213*	$^{22}\text{Mg}$ structure controlling the $^{18}\text{Ne}(\alpha,p)^{21}\text{Na}$ Hot-CNO cycle breakout reaction - Studied in deuteron transfer using TIGRESS-SHARC at TRIUMF-ISAC II	C.A. Diget
<b>12:40</b>		<b>Lunch – Inside the Hot Spot Café (cafeteria)</b>	
<b>13:10</b>		<b>CLOSED MEETING</b>	
13:40	S1200*	Measuring the $^{26}\text{Al}(n,p)$ and $(n,\alpha)$ reactions	L. Buchmann
14:05	S1204*	Study of the $^{26}\text{gAl}(d, p) ^{27}\text{Al}^*$ transfer reaction in inverse kinematics: implications for the strengths of the key low energy astrophysical resonances in the $^{26}\text{gAl}(p, \gamma) ^{27}\text{Si}$ reaction	G. Lotay
14:30	S1216*	A direct measurement of the $^{17}\text{O}(\alpha,\gamma) ^{21}\text{Ne}$ cross section	C. Ruiz
<b>14:55</b>		<b>Coffee – Auditorium</b>	
<b>15:15</b>		<b>In-Camera Meeting – Inside the MOB Boardroom</b>	



**TRIUMF  
SUBATOMIC PHYSICS  
EXPERIMENTS EVALUATION COMMITTEE  
DECEMBER 2008**

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