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*"Most people say that it is the intellect which makes a great scientist. They are wrong: it is character." Albert Einstein*

## Guidelines for Einstein Supernova Award Applications

The Dr. Albert Einstein Supernova Award is the only STEM award that must be conferred by the National Council, Boy Scouts of America. This document contains:

- Award requirements
- Mentoring notes
- Submission process
- Review criteria

To maintain the integrity and prestige of this award, the highest standards of excellence must be applied throughout the process, and at all stages of review.

### Dr. Albert Einstein Supernova Award Requirements

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#### Gold Level Supernova Award for Venturers

1. Earn either the Thomas Edison Supernova Award while a registered Scouts BSA or the Wright Brothers Supernova Award while a registered Venturer.
2. Complete FOUR additional Supernova activity topics, one from each of the four different STEM areas. (Note: The intent is that upon completion of the Dr. Albert Einstein Supernova Award, the Venturer will have completed two Supernova activity topics in each of the four STEM areas for a total of eight.)
3. Create and propose a new Nova Awards topic for any program (Cub Scout, Webelos Scout, Scouts BSA, or Venturing) comparable to the existing Nova Awards topics at that program level. Prepare a written outline for this proposed Nova Awards topic and submit it to your mentor.
4. With guidance from your mentor, select a current STEM-related concern and develop a research project or experiment related to that area. Prepare a one-page written proposal detailing your scientific hypothesis or engineering objective and your proposed experimental methods, which must be approved by the National STEM in Scouting Committee before you begin work. This research project or experiment should be challenging and should require a significant investment of time and effort on your part. (A guideline would be approximately 100 hours.) If your mentor is not a specialist in the area of your project or experiment, he or she will request assistance from a specialist who will serve as a STEM consultant. Execute the project or experiment, and then prepare a complete and well-documented written report AND an oral presentation. Present both reports to your mentor and to your local council Nova committee.
5. Submit [the Einstein Supernova application](#) to the national Einstein Supernova Committee and receive approval (einstein@scouting.org).

Note: Supporting documentation, reports, and data for all parts of all requirements must be submitted with the application.

## **Mentors**

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Candidates for the Dr. Albert Einstein Supernova Award must work under the guidance of an approved mentor who is not their parent/guardian, but who is a STEM professional or person qualified in a STEM field. The mentor must be approved by the council's STEM Nova committee in advance, complete BSA Youth Protection training, and be registered with the council as a Supernova mentor.

The council is encouraged to provide guidance, training, and certification to qualified advisors. The role of the mentor is to guide the candidate when selecting significant STEM research projects and to coach the youth into preparing, researching, consulting others, designing, planning, and carrying out the research. The mentor must approve the application, verify that the candidate's activities have been monitored and reviewed, and ensure that all projects were of highest quality. Ideally, the mentor and Scout will develop a professional relationship that will outlast the presentation of the award.

## **Project Approval**

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It is required that the candidate have the proposed research project or experiment (requirement #4) reviewed by the national STEM in Scouting committee before significant work begins. This review ensures that the proposed project is of sufficient scope and intellectual content, and to pre-empt issues at the final review.

The project should be of significance and value to both the Scout and to the scientific community, with the Scout making a meaningful contribution to a STEM field. An Einstein research project or experiment cannot be primarily developed for an organized competition. It cannot consist primarily of following instructions developed by someone else. Most importantly, the Scout must be involved in the planning and development, and must make a significant intellectual contribution to the project.

The Scout should send a one-page description of the proposed research, including background, significance, location, and the specific role the Scout will fill, to [einstein@scouting.org](mailto:einstein@scouting.org), with a copy to their Supernova mentor. A brief description of the mentor's credential should also be included. Reviews will be completed within two weeks whenever possible.

## **Submission**

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All Einstein Supernova Awards must be approved first by the local council STEM Nova committee, or Advancement committee if the council has no STEM Nova committee. This committee should be composed of knowledgeable professionals who are active in STEM fields. The candidate will not only provide written copies of all activities, reports, proposed Nova, and other work, but will also deliver both an oral presentation and a written report on their research project to this committee in a formal setting (scheduled well in advance, with appropriate visual aids, including time for questions from the audience, and so on).

After the council has determined that all the requirements were met, the entire application package and all supporting documentation, including visual aids (and a video of the presentation, if possible) is forwarded to the National Einstein Supernova Award Committee at [einstein@scouting.org](mailto:einstein@scouting.org) for National review and final approval.

Both the council and the national committees will evaluate the work. Consideration should be given for how much the candidate actually contributed to the research project or experimental effort, and the extent to which the candidate has learned from that experience. Detailed review criteria are below.

Applications will be reviewed as quickly as possible, normally within four weeks of receipt. While all work must be completed and approvals obtained prior to the candidate's 21st birthday, applications will be accepted for review up to three months beyond that date. The candidate and the local council will be notified as soon as possible of the national committee's decision. The national committee may request additional information before making a decision.

## Review Criteria

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The application, with all supporting documentation, is the primary basis upon which decisions are made. The following checklist will be used by both council and national committees when reviewing applications. The list may also be used by candidates to help in preparing their applications.

In addition to the application form, the candidate must submit complete documentation of all requirements, including:

- Date that the Thomas Edison Supernova Award or Wright Brothers Supernova Award was earned.
- Worksheets or reports on all activities, showing data collected, analysis, and conclusions.
- Proposed new Nova award, in the same format and style as existing Nova awards.
- Written report on the research project or experiment, including:
  - Description of origin of project idea
  - Documentation of national STEM in Scouting committee's approval
  - Background science and hypothesis
  - Where work was conducted, and under whose supervision
  - Methods used
  - Results and conclusions
  - Future work resulting from this project or experiment
  - Supporting materials (photographs, news articles, letters of appreciation, sketches, and copies of lab notebooks) Total number of hours spent on this project or experiment
- Date of oral presentation to the Council STEM committee and their feedback on the presentation.
- The Scout may submit a short video of not more than five minutes in length (generally 10MB or less in a common format such as MP4) that describes the application, research project, career plans, etc. If a video of the presentation to the Council committee is made, a copy should be provided to the National committee.
- If the work was presented or published in a scientific forum, that should be noted.

Consideration will be given to a neat, concise, organized package. The candidate should give special care to the appearance of the application and the thoroughness and correctness of all information provided. Missing or inaccurate information may delay review of the application while it is requested. While it is not required that all information must be typed, all information must be clearly legible. All

effort will be made to protect and return original supplemental materials. The original application, however, will not be returned. Candidates and councils should keep copies.

Applications will be evaluated according to the following criteria:

### **Procedural**

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- Were all requirements completed while the candidate was a registered Venturer?
- Were all requirements completed before the candidate's 21st birthday?
- Has the candidate completely met all of the requirements for the Einstein Supernova Award, as evidenced by the documentation provided?
- Was the mentor not the candidate's parent, guardian, or unit leader?
- Was the mentor approved in advance by the local council?
- Did the candidate submit a complete application form?
- Were all required signatures obtained?

### **New Nova Award**

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- Did the candidate complete a draft Nova award for Cub Scouts, Webelos, Scouts BSA, Venturers, or Sea Scouts?
- Was the draft written the current format of Nova award?
- Is the module innovative? Are there significant and original hands-on activities?
- Are the requirements appropriate for the level chosen? Are they possible for Scouts with limited resources, and challenging for Scouts with significant resources?
- Are sufficient background material and counselor notes included?

### **Research Project or Experiment**

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- Based on the documentation provided, has the candidate completed a substantial STEM research project or significant experiment?
- Was the research project original? Did the results add to the general body of human knowledge?
- Was the project approved in advance by the national STEM in Scouting committee?
- What literature search was made to verify that the project was original and/or was substantial and meaningful?
- Did the Scout learn new skills or technologies in order to conduct the research?
- Was the research conducted in a professional environment?
- Was the candidate working with other STEM professionals as colleagues?
- How much time was spent working on the project?
- How involved was the mentor in developing the project and guiding the Scout?
- Did the candidate document the project thoroughly, in an appropriate manner?
- Was information included on reasons for choosing this project, scientific background, hypothesis, materials and methods, results and conclusions, future work, references, coworkers, and supervisors?
- Was the written report thoroughly documented, with appropriate references?
- Were the results of the work published or presented in any scientific forum? By whom?
- Does the research demonstrate excellence and meet the spirit of the award?
- Is the research clearly a significant undertaking and accomplishment for the candidate?

- Did the candidate present a polished oral report to the appropriate committee, with appropriate visual aids?
- Was the candidate able to answer questions about the research?

### Sample Projects

- Scout researched, examined, and compared various General Circulation Models of Saturn's moon Titan to identify the one that would most accurately allow identification of the locations of updrafts on that body. They then used the best model to analyze the practicality and feasibility of a glider mission on Titan, which could use updrafts to improve both range and endurance. It was determined that a glider mission would be practical and feasible, with a maximum glider range of 4000 km, about a quarter of Titan's radius, and a maximum endurance of about 3.5 Earth days. Results were presented at three international scientific conferences.
  1. 17th AIAA Aviation Technology, Integration, and Operations Conference, the AIAA AVIATION Forum, 2017 June 5-9, Denver, Colorado. "Optimizing Autonomous Glider Designs for the Exploration of Outer Solar System Atmospheres" by C. Colletti, R. P. LeBeau, and G Bramesfeld.
  2. Organisation Scientifique et Technique du Vol à Voile Congress XXXIII in Benalla, Australia, 2017 Jan "Investigating Designs of Autonomous Glider Exploration of Outer Solar System Atmospheres," C. Colletti, R. P. Lebeau, and G. Bramesfeld.
  3. Organisation Scientifique et Technique du Vol à Voile Congress XXXII in Leszno, Poland. July 2014. "Exploring the Possibility of Autonomous Gliders in the Atmosphere of Titan." LeBeau, R.P., Colletti, C., Bramesfeld, G.
- Developed a machine learning classifier to predict glaucoma drainage device failure after optical surgery, and compared results to predictions made by ophthalmologist collaborators. Results currently in press by a scientific journal.
- Developed a static star model on a quantum field background, then let the pressure of the star fall to zero, collapsing the simulation into a black hole. Used the model to examine the boundary between the black hole and empty space, searching for possible sources of Hawking radiation.

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