THE WILTON OBSERVATORY PROJECT

"From Where Will Our Next Explorers Emerge?"

The Wilton Observatory Project represents a new dawn in K-12 education and will stand as a benchmark in educational excellence both locally and abroad. Your contribution will help to bring about a bright new future for the whole of humanity.

The Wilton Observatory Project

"FROM WHERE WILL OUR NEXT EXPLORERS EMERGE?"

PROJECT MISSION

The overall mission of the Wilton Observatory Project is to expand upon the already robust offerings and technological capabilities of the Wilton Community School by providing an inspirational and educational arsenal of astronomy technology. This technology will be adapted and integrated to supplement and support existing STEM programs and curriculum as well as create stand-alone educational avenues. "Every Child Benefits, Every Child Is Inspired" is a core tenant of the project and will be crucial in answering the question of "From where will our next explorers emerge?"

PROJECT FUNDING

The Wilton Observatory Project will seek funding through campaigns targeting social media, PTO engagement, corporate and private partnerships along with philanthropic organizations. All proposed costs are expected to be covered by fundraising and the project is not seeking construction and instrumentation funding from the School Board. The project also seeks to cover ongoing operational expenses via a fund set up with money not spent after all initial costs are covered. The project seeks only the land needed for the building phase. Reoccurring electrical, gas, and building maintenance costs will be incurred by the school district, as with any school facility. These costs, as previously stated, will be supplemented by the profits of the observatory investment fund.

OBSERVATORY LOCATION

The proposed location of the observatory will be on the grounds of The Wilton Community School, East of the maintenance building and football field, near the Southern border of the property. This location provides easy access to electrical and gas services, as well as high-speed data. This location also provides the students with a modest walk, reducing travel times seen with more remote locations along the Northeast portion of the property. The Observatory Command Center, housing the control and data acquisition computers and main instructional space, will be located within the AG Building, utilizing a remodeled space formerly used as a computer lab.

OBSERVATORY DESIGN

This project utilizes a unique, cost-effective and environmentally conscious approach to development. The main observatory that houses the primary telescope, a 12" Meade LX600ACF, along with the instrumentation will have a roll-off roof with a centrally located and seismically isolated pier. Local control and observation will be available within this building through the use of a small-scale control center, featuring full system operability across all modules and applications. Temperature will be maintained within a few degrees of ambient outside air temperature and the space will feature a dehumidifier.

This approach reduces heating and cooling costs and impact, as well as increases the quality of the observatory user experience through reduced temperature differences. Interior lighting will have both white and red options for normal and night vision operations.

The Observatory Command Center will be developed within an existing building on the grounds of the Wilton Community School. The former ICN Room in the AG Building will be remodeled to meet the needs of the project. The resulting space will feature a Command and Control Station where students and student groups will be able to guide the telescope, monitor target tracking, formulate target lists, monitor live feeds from international notification networks and monitor progress. Their activities will be featured on a large TV above their work station. At a separate location within the room will be a Data Acquisition Station where students and student groups will control the instrumentation packages attached to the telescope. Their work will be featured on a TV above their work station as well. Central to both stations will be a teacher's desk that will feature a computer capable of controlling and monitoring all aspects of the observatory and can be utilized as a stand-alone command station during times when students are not engaged in Command and Control and Data Acquisition activities.

Data sets collected during the course of observatory operations will be cataloged and stored in cloud storage and will be accessible to other students, student groups and teachers. This aspect of storage for future utilization adds depth and purpose to the activities the students will be involved in. The Observatory Command Center will feature work stations loaded with processing and analysis software that will allow students the opportunity to collect incoming data and analyze it or compile it into sets for other uses. Functionally this provides four separate avenues of exploration within the same space, those being Command and Control, Data Acquisition, Data Processing and individual or teacher-led study.

Through the utilization of an existing space for our Observatory Command Center we will reduce our environmental impact for this project, see an underutilized room have new life breathed into it, meet all ADA requirements, provide restroom facilities to program users, as well as increase overall accessibility to all grade levels. This mixed approach to project development truly will be the best blend of old and new.

PROJECT ADAPTABILITY

Whereas the project is rooted in the installation and standard utilization of the 12-inch Meade LX600ACF telescope for astronomy, the overall project is adaptable to meet many other educational needs and goals. The following represents a portion of the overall adaptability of the observatory and can be expanded upon easily.

Art - The observatory represents an exciting opportunity for student artists! Pairing the telescope with a camera and a suite of simple-to-learn programs, the budding graphic designer or science photographer can capture the majesty of the skies above! These pictures can then be utilized through many different avenues of post processing and artistic adaptation as well as merchandise production for further fundraising.

Chemistry - Utilizing the advanced guiding and light gathering abilities of the telescope and pairing them with a device such as the Shelyak Alpy 600, one can analyze the spectral signatures of objects in the night sky and determine through computer analysis their composition. This is an exciting prospect for students as the search for life and habitable planets expands and more scientists will be needed for this effort in the future.

Communications - Utilizing solar filtration, students and teachers can explore features of the Sun that impact communications on Earth! From sun spots to prominences and even solar flares, students will be able to see in real time the activity of a body 93 million miles away that has a direct impact on them and the technology they rely upon!

Computer Science - In modern applications of nearly any field in existence, computers have come to dominate all aspects of modern life. Astronomy is no different! From the control software intrinsic to the telescope, to the exterior control computers and post processing programs, the observatory will be overflowing with opportunities to discuss and interact with computers on a level beyond that of everyday use. From programming advanced functionality to simply inputting coordinates, many teachable moments and avenues exist!

Conservation - Trash is as much a problem in space as it is on Earth! With modern space exploration has come a vast field of debris in various forms that requires tracking and cataloging so safe space flight is possible into the future. Some pieces of this debris field are easily seen in a telescope and can be tracked and photographed! Students will be able to study this aspect of modern space exploration and its many implications, such as future cleaning needs and impacts on current missions.

Current Events - Solar events and transient objects buzzing through the solar system are always occurring and easily excite children and adults alike! The observatory will provide a means of interacting in a meaningful way with exciting topics such as comets, meteors, and sun spots! With the provided database links and early warning networks, students can witness exciting current events in space as they occur!

Earth Science - Many things in space impact or have impacted our life here on Earth. Through the study of the solar cycles, hydrological features of Mars, impact features on the moon and so on, students will gain a greater understanding of how life here on Earth could have arisen and how it is intertwined with the skies above.

Engineering - Material science and the integration of complementary systems into a single, functioning unit are key aspects of engineering. Students will be able to witness and study the instrumentation present in the observatory and explore how, through quality engineering, these objects are made, function and interact.

General Astronomy - The most central and broad of the observatory's applications, General Astronomy allows a student to be introduced to the sky at any age and can be adapted to meet the needs and requirements of any group. From showing Pre-K students the Sun and second graders the basic features of the moon, to showing advanced orbital movements, planetary satellites and shock wave propagation through gas fields to high school students, simply looking up through the telescope will open up the eyes and minds of everyone at the school!

Geology - Geology is an important aspect of many fields in today's world. From rare minerals to the mining of silica and natural gas, geology plays an important role in our lives. The observatory will allow students to do comparative analysis of surface features of the Earth and the Moon to gain a better understanding of the weathering processes present on our home planet, as well as processes present on our neighbor and future colony, Mars.

Math - Math plays an indispensable part in the study of the skies above! From the basics of orbital periods and seasons to the advanced calculations present in predicting the orbit of transient bodies, many aspects of math can be explored with the observatory!

Mythology - Once you witness the majesty of a dark sky and the beauty it contains, it is no wonder why great stories arose from the patterns ancient societies saw in the heavens above! Students can explore vast star fields and constellations and learn of the associated mythologies, who created them and what role they played in ancient life.

Philosophy - Man's place in the universe and what role we should play in the forces that abound have always been a great topic of discussion. Students can gain a better understanding of the true scale of the universe through visual observation and this will help to bring about a less myopic world view.

Physics - Physics is all around us and binds the very fabric of our existence! Students will get to witness and discuss physics concepts from the simplest to the most advanced and get to witness the impact that these laws and theories have on the universe! For as long as one wishes to explore this topic and to whatever extent they chose, the observatory will provide them ample avenues of study!

SETI - Perhaps the most exciting and intriguing aspect of astronomy and human existence is the search for life outside of our home planet! What would it look like? Are they trying to communicate with us? What biological and technological signatures should we look for as we explore? Students will get to explore all of these topics and more with the observatory and SETI Analysis Station! From exploring topics such as seeding with comets and asteroids to witnessing the live analysis of incoming data, this topic is sure to excite and intrigue everyone involved!

PROJECT MODULES

The project goals and adaptability will be achieved through using a selection of advanced scientific instrumentation designed with a modular approach. The modular approach suggested is aimed at reducing setup time, increasing instructional time and reducing the likelihood of component damage due to repeated interaction through disassembly and reassembly, as well as foreign material intrusion. The results are better time utilization, reduced component damage, maintaining more stable data quality and better overall student experience. The modules are as follows:

1. **DSO Imaging Module**
   a. Atik 16200 APS-H Mono CCD
   b. FLI-CFW-3-12 12-Position Filter Wheel
   c. Astronomik LRGB Filter Set 50mm Round
   d. Astronomik 6nm 50mm Round Filters Ha, OIII, SII
   e. Chroma 50mm Jovian Methane Filter
   f. Baader 8.5nm 50mm Round H-Beta Filter
   g. Baader 2" Focusing Filter (as a protector)

2. **Planetary/Lunar Imaging Module**
   a. ZWO ASI290MC Color CMOS Camera
   b. ZWO EFW Five-Position Filter Wheel
   c. Baader 1.25" UBV Photometric Filter Set
   d. Baader 1.25" IR-Pass Filter
   e. Baader 1.25" IR-Block Filter
   f. Baader 2" Focusing Filter (as a protector)

3. **Spectroscopy Module**
   a. Shelyak Alpy 600
   b. Shelyak Guiding Module
   c. Atik 314L+ Mono (for data acquisition)
   d. Atik Titan Mono (for guiding)
   e. Shelyak Photometric Slit
4. **Solar Module**
   a. Lunt 60mm Hα Solar Telescope (LS60THAB1200FTPT)
   b. ZWO ASI174MM (Hα Camera)
   c. Meade 13.75" White Light Solar Filter
   d. ZWO ASI178MM Mono (White Light Camera)
   e. Itty Bitty Radio Telescope
   f. Baader Hyperion 8-24 Eyepiece
5. **Visual Astronomy Module**
   a. Baader Morpheus 76° Eyepiece Set
   b. Baader 2" Moon & Sky Glow Filter
   c. Baader 2" UHC-S Nebula Filter
   d. Baader 2" ND Filter

All modules, with the exception of the radio telescope, will mount directly to the primary telescope, a 12" Meade LX600ACF. This telescope will be donated free of cost to the school district under the terms that it be mounted on a permanent pier, housed in an appropriate observatory and utilized to enrich the learning experiences, scientific opportunities and quality of schooling for the students of the Wilton Community School as well as the public. Additional telescopes of varying sizes and configurations will be sought for the project, with the goal of having eight quality telescopes by the end of the observatory's first year.

MODULE CAPABILITIES

The following represents an overview of the proposed module capabilities. How each module ties into current or proposed program curriculum and outreach projects will be determined by staff based on need. The modules that incorporate filtration and cameras are designed to capture scientifically valid and useable data that can be submitted to professional studies through open sharing. This open sharing will allow students to participate in the scientific community in a meaningful and impactful way, leaving a legacy of educational excellence in their wake.

1. **DSO Imaging Module** – This module will allow students and teachers to capture in great detail deep-sky objects ranging from thousands to millions of light years away. By separating the visual spectrum via narrowband and broadband filtration, and then capturing that visual data with a cooled monochrome CCD, students will be able to stack and construct photographs with a quality equal to the famed NASA APOD selections. This will allow detailed study of distant structures, including nebulae, galaxies and protoplanetary clouds. Additional capabilities will be studying concentrations of certain elements, capturing transient targets, hunting for asteroids and comets, and many more exciting possibilities!

2. **Planetary/Lunar Module** – This module utilizes a camera and filters specific to the observation and study of bodies within our solar system. This module allows students and teachers to explore in great detail the planets, their moons, as well as our moon and transient targets in a way that is far beyond a student's normal level of exploration into this field. The capabilities of this module will bring our nearest cosmic neighbors even closer and allow for a wonderful learning experience!

3. **Spectroscopy Module –** This module will open up an exciting world for higher grade levels and allow students to analyze in real time the chemical composition of cosmic bodies. By collecting and passing the light of distant bodies through this unit, the students will be able to analyze the resulting spectral signatures via computer software, an educational tool usually reserved for college level study. This module will also allow for measuring the temperatures of stars, an important data set to have in our continuing hunt for habitable worlds, as well as exploring the spectral signatures of supernovae.

4. **Solar Module –** All module components functioning in unison will allow students and teachers a real-time view of our parent star in two separate visual wavelengths along with narrowband radio spectrum! These function in a manner that will allow everything from simple viewing of the solar disk to advanced comparative analysis of solar flares, CMEs and surface phenomena and their respective radio signatures. This opens up a world of possibilities for students of all ages and helps to expand usability around the clock, building an even more robust instructional repertoire.

5. **Visual Module –** The most basic of the modules also stands as one of the most profound. This module presents the students with the opportunity to have photons that have traveled for thousands to millions of years to be collected and fed directly into their eyes. This allows an immersive, simple and visually appealing window into the universe.

PROJECT TIMELINE

The timeline of the project is heavily dependent upon fundraising success and efficiency. The anticipated flow of execution for individual project aspects is as follows. Once approval is granted, the project committee will immediately engage in a comprehensive PR campaign with a focus on raising funds and bringing attention to the project. Press releases will be issued by the project committee to a list of media contacts at the local, national and global levels. The project will utilize Facebook, Twitter, Instagram and YouTube to distribute promotional media and keep the public informed of project progress and needs. Fundraising through social media will be achieved via the utilization of PayPal and PayPal.me, with all accounts linked directly to the school banking apparatus for audit, accounting, project funding and transparency purposes. Donations of cash and checks will be mailed directly to the school and be earmarked and deposited. All incoming and outgoing funds will be easily traceable and will be maintained by the District.

Project execution will occur once the entire project is funded. The project committee anticipates construction to begin in the spring to the summer of 2018. Following the execution of the construction phase, interior components needed for the instructional space will be purchased, followed by instrumentation modules in order of program importance, and lastly the public outreach program materials. This approach will ensure that each phase of the project is funded and executable as designed, as well as ensure that program goals are met.

Once all phases of the project are complete and the observatory has achieved full operability, the remaining money raised for the observatory will be invested into the fund mentioned earlier.

Taking into account weather conditions, build times, as well as setup, calibration and test times for the proposed equipment, the project committee anticipates the observatory to be fully functional just prior to the start of the 2018-2019 school year. Teachers and staff will be provided with instructional material as well as hands-on instructional time in the observatory prior to full integration into school programs and curriculum. Utilization and scheduling of classes will be handled by the school.

CLOSING THOUGHTS

The true scope and impact of this project goes far beyond simply letting students get a better view of the sky or inspiring future astronomers. This project presents an opportunity for students to expand their minds in ways that crush the systemic myopia that plagues society. This project presents an opportunity to explore not only nebulae but also nebulous concepts, concepts such as humanity, space exploration and future development in any field imaginable! This project sets the stage for the development of future doctors, philosophers, engineers, botanists, astronauts, artists, photographers, graphic designers, IT specialists, chemists and every other discipline imaginable! The world that this project opens up for students is a world in which each of them has a vital role to play and one where nearly any passion can be applied! Through partnerships and funding from people like you, this project will build upon the robust educational heritage of Wilton and leave a legacy of intellectual advancement in the K-12 sector, the likes of which there are no rivals in the region! The impact of your generosity will be felt far and wide for many years to come as the bright minds you help to create disperse into the world to leave their mark on humanity. Come, let us reach for the stars together!

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SOCIAL MEDIA

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https://twitter.com/wcsobservatory

DIGITAL MEDIA

https://www.youtube.com/watch?v=wkr4Yqqhfv8

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Wilton Observatory Project

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