

# **The Hall of Science**

**A Play In One Act**

ASTR 191 1-1:50 P.M.

### **Dramatis Personae:**

**Actor One/Al-Sufi:** The scientist representing astrometric detection, as well as the actor playing the character. The oldest character, and a figure of some past disrepute, now attempting to reestablish credentials.

**Actor Two/Spitzer:** The scientist representing planetary transit, as well as the actor playing the character. Overly excitable and prone to quick judgments.

**Actor Three/Struve:** The scientist representing radial velocity, as well as the actor playing the character. A hard worker, but very irate at Spitzer for his/her appropriation of Struve's work.

**Actor Four/Kogo:** The scientist representing direct imaging, as well as the actor playing the character. The youngest scientist, with little to show for his/her efforts.

**Director/Bailiff:** The organizer of the proceedings, he/she remains impartial and displays no emotion, instead acting as a conduit for the (unseen) judge's will. Also the director of the play, in the first and last scenes.

### **Planetary Dancers**

### **Staging Notes:**

This play is heavily influenced by Bertolt Brecht's idea of the "Alienation Effect;" that is, the belief that an audience constantly reminded of the artificiality of the artwork and staging process allows the meaning of a piece to be conveyed to them more directly. The themes of this work are of the importance of rationalism and cooperation, and no effort has been made in the writing to camouflage that intent. A successful staging should likewise keep in mind that the directness is not an accident but rather the point of the whole exercise.

All characters are gender neutral; names may be used to indicate ethnicity, but no firm ethnic typing should be assumed.

As this work is being done for a class project, and as the intent of that project is that the work be able to convey meaning to a large, uninitiated audience, it could be argued that a brief introduction to the conventions of playwriting is in order. Thus, I will present a quick guide to understanding the play formatting used in this work; feel free to skip if there is no confusion as to formatting.

ME: Text set off by a name out front like this is dialogue, meant to be spoken by the character whose name appears before the colon. In the first line spoken by the character, the full name of said character will be used. In subsequent appearances, a shortened identifier may be used; this identifier will be unique to the character and clearly point to the full name. (Text in the middle of dialogue separated out by parenthesis like this is stage direction, used to indicate action in the middle of the dialogue section, and should not be read out loud).

A text block like this is also indicative of stage direction; it should generally indicate actions taken between the dialogue bits it separates, unless otherwise specified in the text itself. It will be separated from the preceding and following dialogue by a full line of blank space.<sup>1</sup>

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<sup>1</sup> This is a footnote; it will indicate reference in this format: (Author's Last Name). If the last name could refer to more than one work in the references page, the work title will also be added. If no author name is available, than the work title shall be used.

## Scene One - Prologue

Setting: Dark stage. The ACTORS and DIRECTOR mill around the stage, assembling the set; they are dressed in simple, black clothing. Non-scripted dialogue should accompany – ACTORS asking questions, the DIRECTOR giving orders. Finally, the DIRECTOR turns to the audience and is spot lit.

DIRECTOR: Good evening (or whatever time the play is being performed) ladies and gentlemen. I would like to welcome you to today's (air-quotes) "entertainment." I am the director, and the four good people working behind me are my actors.

A chorus of unorganized "hellos" from the actors; lights go up to half.

DIR.: Our purpose here today is to entertain you, certainly; you have, after all, paid us good money for the privilege of attending our show. But we also aim to edify you. For the search for knowledge is eternal, and man must ever seek- (ACTOR ONE sighs loudly; the DIRECTOR turns to him/her) Excuse me?

ACTOR ONE: What?

DIR.: Am I boring you?

ONE: A bit.

DIR.: Well, excuse me. I was under the impression that this was my show, but I guess-

ACTOR TWO: Oh, just get on with it.

DIR.: (taken aback) Et tu, (insert ACTOR TWO's real name in dialogue here)?

TWO: No one came here tonight to hear you lecture about progress, you know. They have cable networks for that now.

DIR.: Do not ever, ever speak to me about vulgar entertainments again. (shaking head) Cable television indeed.

ACTOR THREE: Are we going to do the show or not? I have a paper I could be writing, if I wasn't screwing around here.

ACTOR FOUR: Yeah. We all have other things to do.

DIR.: What, like playing Playstation?

FOUR: What I do with my time is none of your business.

THREE: (to audience) Look, people, do you want us to get on with the show?

ACTOR THREE and the other ACTORS exhort the audience to cheer.

DIR.: Very well. Just let me set the scene quickly.

The ACTORS all sigh.

DIR.: This is still my show, right? I am the Director? I can narrate my play, correct? (the ACTORS grumble) Could you all take your places, then? Please?

The ACTORS wander offstage; lights go down.

## Scene 2 - Assembly

Setting: The scene continues from the previous; the scene distinctions mostly concern the characters alternating from their “actor” roles to their “character” roles. The DIRECTOR will be alternating between narrating as him/herself and “acting” as the BAILIFF. During the following narration section, the ACTORS assemble the remainder of the set, while the BAILIFF is once again spot lit.

DIR.: Far away from this place lies the August Hall of Science. In this Hall resides the Judge, arbiter of Science, almighty magister in charge of the quest for knowledge. This Judge, since time immemorial, has guided the hand of mankind as they explore their world. Periodically, a crossroad is reached, a fork in the growth of understanding; these are the times when the Judge must call a court. Representations of the divergence points plead their cases to the Judge, and await arbitration. Witness, now, just one of these incidents... the case of Planetary Detection.

The lights go up, and the set is now entirely visible. The wall is black, with a projector facing it, which occasionally projects a star field on the background. Center-downstage is a bench. Stage right features a pulpit; stage left is empty space, with a few props scattered about (these will be used in the dance sequences). The DIRECTOR exits stage left. After a moment, AL-SUFI enters stage right, clad in nightclothes.

AL-SUFI: Where am I? I can't remember... I laid down to sleep in my apartment, didn't I? I recall that much, I think. Didn't I? Then... this must be a dream. (pause) But this place... something feels familiar, but how could it? Have I ever been here before? Waking or dreaming? (pause; he looks upstage center, at the audience, and freezes, shocked) The Judge? But how can I know that? Dreaming or waking?

SPITZER: (off-stage right) Oh, shut up already.

SPITZER enters, also wearing night clothes.

AL: Excuse me?

SPIT.: All that whinging. “Where am I? What’s going on?” (pause) Hey, wait a minute. Where ARE we? What IS going on?

AL: Hah! Who is whinging now, stranger?

SPIT.: Who is the... (to AL-SUFI) shut up. I mean, what’s... (he looks center upstage, seeing the Judge) Hey! Hey, buddy!

AL: This will do you no good, I promise you.

SPIT.: (to AL-SUFI) Go to hell. (to upstage/judge) Hey, you! What’s happening here?

STRUVE: (entering stage right, dressed in night clothes) Some jackass is making a ton of noise, that’s what’s happening. Don’t you know people are sleeping? (pause, looking at SPITZER) Don’t I know you?

SPIT.: I don’t think so. If you do, please tell me who I am; I’m not even sure.

STR.: Me neither, come to think about it. But I could swear-

SPIT.: (to upstage/judge) Hey! Help us!

STR.: (looking upstage/judge) Who is that?

SPIT.: I don’t know.

AL: It's the Judge. (the others turn to face him)

STR.: The what?

AL: The Judge.

SPIT.: And just how do you know that?

AL: I don't know.

SPIT.: How do we know you're not in on this... kidnapping plot, or whatever?

KOGO: (entering stage right, confused, in nightclothes) Who are you guys?

SPIT.: Who are you?

KOGO: I... don't know. Who am I?

BAILIFF: (off-stage left) You are the Scientists.

The scientists look around, shocked. The BAILIFF enters stage-right, dressed in formal robes and carrying a large staff; both the staff and robes are covered in scientific symbols (Greek letters, the symbol for pi, etc.)

BAI.: And I am the Bailiff, speaker for his honor, the Judge, overseer of all Science.

SPIT.: And just what kind of horseshit is this?

BAI.: You will respect the solemnity of this court. Or else.

SPIT.: Or else what?

BAI.: Or else you will be held in contempt. Behold!

The BAILIFF brandishes his staff; SPITZER begins convulsing as the lights flash rapidly. After a moment, the BAILIFF lowers the staff, the lights cease flashing, and SPITZER falls to his knees.

SPIT.: I'll be good! Just... just don't do that again.

BAI.: The scientists will please seat themselves on the bench, so the proceedings can begin.

The scientists shuffle over to the bench and seat themselves, while the BAILIFF walks center stage.

### Scene 3 – First Argument<sup>2</sup>

Setting: Continuation of last scene.

BAI.: Your Honor, the case of Planetary Detection. First, Al-Sufi for Astrometry.

The BAILIFF drifts to stage left as AL-SUFI, hesitantly, gets up.

AL: That... that's me, right?

BAI.: That is correct.

AL: I'd forgotten...

BAI.: Such is the nature of the Court. To your station, please.

AL-SUFI walks over to the pulpit.

BAI.: This is not this Scientist's first time before this court.

AL: No, it... it is.

BAI.: In the past, in an age of darkness, you and your fellows kept the light. You brought us your catalogues and received our blessings.

AL: I don't know what you mean. I am just a humble scientist, in the early twenty-first century.

BAI.: What was once shall be again. What has your science wrought?

AL: Well... (composes self) well, we've recently had an exciting breakthrough.

BAI.: Present your work, please.

AL: My team... that is, the team I am on... I think... we've discovered a planet.

STR.: Oh, big whoop.

BAI.: (to STRUVE) The time for refutation comes later. Speak further and risk incurring my wrath. (to AL-SUFI) Continue.

AL: Vb-10 is a red dwarf, a tiny, M-class star, twenty light years distant from our Earth, in the Aquila constellation. We've discovered a planet circling it. Vb-10b.

BAI.: And how was this feat accomplished?

AL: Astrometry uses the gravitationally-induced motions within a system to detect planets.

As AL-SUFI speaks, the DANCERS emerge and perform the first Dance of the Planets, simulating the motions of the Vb system. The projector comes on, throwing "stars," or at least pinpricks of light against the black wall.

AL: The gravitational interaction of planets and stars is a well-known and studied phenomenon. By observing shifts in a star's position in the sky, astrometry allows us to infer the existence of planets.

BAI.: What kind of planets?

AL: Well, so far, our instruments only really let us detect fairly large planets, orbiting close to smaller stars. Because, you see, the gravity shifts the stars more noticeably. Vb-10 is a red dwarf, a tiny red star on the low end of the H-R Diagram. Vb-10b is six times the mass of Jupiter, and orbits its companion at a distance similar to that of our own Mercury. Star and planet, dancing together, mover and moved both...

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<sup>2</sup> Unless noted otherwise, all specific data is from Naeye, Robert

The lights dim and gentle orchestral music rises as the planetary DANCERS come to life. They circle each other closely, as the projected stars come to life as well, dancing on the walls. A moment passes, and then...

SPIT.: Horseshit. (stunned silence; the DANCERS cease and exit, the lights come up, the projector turns off) What? We're all thinking it. This is utter crap.

BAI.: Now begins the critique.

SPIT.: Does anybody else remember Barnard's Star? Or Lalande 21185? This man's confederates told us that they, too, had found planets. It was a lie. Nothing was there.

AL: A mistake, not a lie. Perhaps a rush to judgment-

SPIT.: And how do we know this isn't? We've been down this road before.

BAI.: And the rest of you? What say you?

STR.: I can find little in Astrometry's past to lead me to credit it.

KOGO: This science is old and decrepit.

AL: And what does age have to do with anything?

KOGO: (gently) Your era is done, old man. It's time to make way for the new.

BAI.: Thank you, Al-Sufi. You may be seated.

AL: But...

BAI.: Be seated, please.

AL-SUFI slinks back to the bench, defeated.

### Scene 4 – Second Argument<sup>3</sup>

Setting: Continuation of last scene.

BAI.: The court now calls Spitzer, speaking for Planetary Transit.

SPITZER blinks, suddenly realizing his name has been called. He gets up and goes to the pulpit.

SPIT.: That's me, huh? Spitzer...

BAI.: Mr. Spitzer, please present the court with the case for your Planetary Transit method.

SPIT.: I hardly think I should be required to present my discipline to you, like a beggar. What is the point of all of this?

BAI.: This is the Court. A Judgment will be made.

SPIT.: Yes, yes, well and good. But what does it mean?

BAI.: Man has reached an impasse. In times such as these, a Court is called. The Judge decides the way to proceed.

SPIT.: I refuse to recognize the authority of this so-called Court. Who has empowered you? What body do you represent?

BAI.: We represent the society of humankind, empowered by necessity. Now answer for your method, or be found in contempt.

SPIT.: Threats again? Very well, I know you can carry them out, at least. (clears throat) Your "Honor," I am a planet hunter. My weapon of choice is the Kepler spacecraft. My prey, celestial bodies.

As SPITZER speaks, the second Planetary Dance begins. The music this time is urgent and primal; SPITZER is aggressive and quick to act, and the dance should convey this. The motions are sharp and fast.

SPIT.: Far away from here, in the Cygnus constellation, lies HAT-P-7b - the prey. The Kepler spacecraft, using instruments to measure the changes to its parent star's brightness, caused by the motion of HAT-P-7b in front of it. The planet is the size of Jupiter – tiny, compared to the "discoveries" of my colleagues, like Vb-10b. And at a range of one thousand and forty light years, no less! The planet hurtles itself around its star at breathtaking speed, orbiting its star every two point two days. A year in a bit over two days! And this is merely the beginning!

The Planetary Dance gets more and more urgent, until...

STR.: I know you! (the dance halts)

SPIT.: What?

STR.: Thief! Thief!

SPIT.: What do you mean?

STR.: Bailiff, arrest this man!

BAI.: It is not the place of this court to restrain, but rather to arrive at a truth.

SPIT.: What's your problem?

STR.: You've been using my calculations, that's my problem! You've been taking my Doppler

<sup>3</sup> Unless noted otherwise, all specific data from Beatty, Kelly

shift figures and mingling them with your... debased “transit” results to calculate planetary masses precisely<sup>4</sup>! To prop up your foolish pseudoscience!

SPIT.: And so what if I have? We’ve found planets, haven’t we?

AL: Except for all those times it turned out that you hadn’t.

SPIT.: Excuse me?

AL: How many false positives have you given the world, Spitzer?

SPIT.: Don’t make me the target of your bitterness, Sufi. Your failures are your own.

AL: Yes, as yours are to you.

KOGO: Besides, how many planets even transit at all? One percent<sup>5</sup>? Relying on an accident of celestial mechanics hardly seems a reliable method of discovery. Moreover, your planets are mostly close in to their planets as well, are they not?

SPIT.: But...

BAI.: Thank you, Spitzer. You may be seated.

SPITZER looks like he’s going to say something, then angrily goes to the bench and sits.

SPIT.: I didn’t want any part of this farce anyway.

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<sup>4</sup> The ideas concerning planetary transit/radial velocity mass calculation come from “Detecting New Worlds”

<sup>5</sup> This figure is from Doyle, Laurance

## Scene 5 – Third Argument<sup>6</sup>

Setting: Continuous from last scene.

BAI.: The court now calls Struve, speaking for Radial Velocity.

STRUVE gets up, dusts off, and walks confidently to the pulpit.

SPIT.: Ask me your questions, Bailiff. I'm not afraid.

BAI.: Please explain this Radial Velocity method to the court.

STR.: Sure, although I hardly think I need to excuse myself. My science speaks for itself.

(clears throat) As even such deficients as my "colleagues" on the bench are aware, light has a property known as Doppler shift, wherein movement changes its spectrum. An object moving towards the observer is said to be "blue shifted" as the light increases in frequency towards the high-energy, bluer end of the spectrum. An object moving away from the observer becomes "red shifted," its light moving to the red end.

BAI.: This is well known. Go on.

As STRUVE speaks, the DANCERS emerge again, this time bedecked in lights (which are, as of this time, off).

STR.: As the Astrometer said, one method of planetary detection is to watch the movement of stars and calculate the gravity that would be required to shift it. We Radial Velociters calculate similarly, only we use solid, reliable spectrographic data. And this pays off. Recently, Michel Mayor's team, working at the High Accuracy Radial Velocity Planet Searcher, or HARPS, has found several planets.

BAI.: How many?

STR.: (smiling) Thirty two.

The other astronomers gasp as the Planetary Dance comes alive – this time to chaotic, experimental music. The background lights come on, and the DANCER's lights flicker on, revealing colors up and down the visible spectrum. The dance itself as random and bizarre, reflecting the movements of many celestial bodies at once.

STR.: Yes, thirty two. And that's just the recent discoveries; the HARPS program has added seventy five entries to the exoplanet catalogue. Those are the fruits of our labors, one hundred nights a year for five years. But it was worth it. This is the greatest single discovery in the history of planet detection! Just... just look at it! At the grandeur! At the scope!

The dance continues, until...

KOGO: And look at their distance.

STR.: What?

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<sup>6</sup> All specific data in this scene is from European Southern Observatory, unless otherwise noted; information concerning Doppler shift is from class notes

The dance ends, the lights normalize.

KOGO: Once again, we only see large planets, close to their stars. There may be a lot of them, but what's so special? How many of them are Earthlike?

STR.: Several of them are super-Earths.

KOGO: Within twenty Earth masses? That's a stretch, isn't it?

STR.: So what, anyway?

KOGO: So the point is to find Earthlike planets, right? Habitable worlds, like our own.

AL: And speaking of theft, what of the concepts you've taken from me? Star shifts and gravitational motion... you've just tarted Astrometry up in colorful clothing.

SPIT.: You criticize me for using your findings, but by doing so, we can use my size calculations and your light data to determine mass. What can you do on your own<sup>7</sup>?

STR.: We can find a minimum velocity<sup>8</sup>.

STR.: But... thirty two... seventy five...

BAI.: Thank you, Struve. You may be seated.

STR.: (yelling, to scientists) You're all just jealous of my achievements!

STRUVE stomps over to the bench and sits down loudly.

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<sup>7</sup> Once again, the ideas concerning transit/radial mass calculation come from "Detecting New Worlds"

<sup>8</sup> This idea comes Hjouj, Fawaz

## Scene 6 – Fourth Argument<sup>9</sup>

Setting: Continuous from previous scene.

BAI.: The court calls Kogo, speaking for Direct Imaging.

KOGO gets up, goes to the podium, and looks at the BAILIFF.

BAI.: You may proceed.

KOGO: Thank you. Friend Judge, Direct Imaging planetary detection has long been a goal of astronomers. It is, after all, a very direct way of finding planets – simply looking in areas where they might be. But the tremendous distances involved have been prohibitive... until now.

The DANCERS return once again. This time, the music swells up slowly – it is somber and dirge like, crystalline and lonely. The DANCERS are far away from each other, trying to move closer, but always ending up far away.

KOGO: Paul Kalas of U.C. Berkley, using data from the Hubble telescope, has discovered a planet circling Formalhaut in the constellation Pisces Australis, twenty-five light years distant. Christian Marois has surpassed this achievement, with three planets in the HR 8799 system, a hundred and twenty light years away. Large planets, sure, but planets none the less. And unlike my colleagues, the planets we Direct Imagers have detected can be farther out from their partner star. Freed from the need for large gravitational forces or the limitations of perspective relative to a planet crossing its star, these techniques allow us new frontiers of planetary detection. And we have already reached a new threshold; the planet orbiting Formalhaut seems thus far to be the coolest and lowest-mass extra solar body science has yet detected<sup>10</sup>.

AL: But they're so... distant. So lonely. Just look at them.

KOGO: It is not our place to make the universe, only to observe it. What business is it of ours if the Creator sees fit to fling planets to the reaches of their systems?

SPIT.: Talk about a need for luck! Just... guessing and looking.

KOGO: Our science is young yet; the resolutions of our instruments have only just become good enough for these searches. But we can claim to have seen our lonely celestial voyagers, to know them physically. Can you say the same?

BAI.: Thank you, that will be all.

The DANCERS leave the stage and the background stars vanish. KOGO shrugs and returns to his seat.

BAI.: And now the deliberations begin.

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<sup>9</sup> Unless otherwise noted, all specific data is from Matson, John

<sup>10</sup> This is from Marley, Mark S.

## Scene 7 – Judgment

Setting: Continuous from last scene. A long pause, and then...

SPIT.: What is this? Is the trial done?

AL: Yes. Now we await a decision.

STR.: And what importance does the decision hold?

AL: All the importance in the world. (pause) This is it. This is the end.

SPIT.: The end of what?

AL: The end of us. Some of us, at least. Maybe one will be lucky.

SPIT.: What?

AL: I remember now, from the first time. There were five of us, proud, and anxious to prove ourselves. We made our cases, and the Judge ruled. Then the others... went away.

KOGO: He... killed them?

AL: No, he simply made them not be. No blood, no mess. Just... nothing.

STR.: Dear lord... is this to be our fate? (composes self) Well, your fate, at least. I believe in my science and its fruitfulness.

SPIT.: Hah! My methods are clearly superior to yours, with their ability to determine more properties than those of you losers.

KOGO: And I have faith in the reality of Direct Imaging. What can compete with seeing an object for one's self?

AL: I can only hope that the pedigree of my discipline will be taken into account.

SPIT.: I can't wait any longer. (to BAILIFF) Hey! Hey you! What's going on?

BAI.: (stepping aside, looking at astronomers) Judgment has been made.

SPIT.: Well, what is it already?

BAI.: It is the opinion of this court... that none have demonstrated superiority.

AL: That's it. We're all dead.

KOGO: That's not fair. I'm young yet, damnit! Give me time...

SPIT.: But.. wait. Why seek only one victor? Why not allow us to work together?

BAI.: Explain yourself.

SPIT.: Like... with how I use Struve's data to get a more thorough view of the planets I've found<sup>11</sup>.

STR.: I'm still a little sore about that, you know.

SPIT.: (to STRUVE) Quiet, fool. (to BAILIFF) Maybe the solution is to share our science, to work together. (to AL-SUFI) To acknowledge the past's guidance (to KOGO) and move to the future's precision. Maybe, by putting aside grudges (looking at STRUVE), we can make a better science for us all.

KOGO: Maybe...

STR.: I don't know.

KOGO: Come on, Struve! Put your bitterness aside, for your own sake.

STR.: I suppose.

SPIT.: Al-Sufi?

AL: Perhaps... there is hope after all.

SPIT.: See, Bailiff? See, Judge? We are untied. Allow us the strength of that unity.

BAI.: (long pause) Your compromise is... acceptable.

<sup>11</sup> And once again, this information comes from "Detecting New Worlds"

The DANCERS enter and the stage comes alive one last time, with the Universe Dance, similar to the Planetary Dance, but larger in scope. Everything moves – commits, meteors, dust. Stars are formed and die, planets spin out, galaxies collide and merge...

AL: It's glorious.

SPIT.: We did it!

STR.: A new golden age of science.

KOGO: Why... why do I feel as though I am fading.

BAI.: Because you are. Because you were never real to begin with. Just thoughtforms, brought here as proxies.

SPIT.: Will it hurt? To... fade?

AL: No.

BAI.: You will still exist. As thoughts, in the minds of men of science. Inspiring them, driving them, to create a better future... for us all.

Lights fade down. Stars go out. The DANCERS leave the stage. Long pause.

**Scene 8 - Epilogue**

The house lights go up. The DIRECTOR removes the Bailiff's robes, revealing the black clothing from earlier; the ACTORS do the same with their bedclothes.

DIR.: And so the trial is complete, the judgment made. And so the lesson has been learned-

ONE: THE MEDIATOR BETWEEN THE HEAD AND HANDS MUST BE THE HEART!

DIR.: What? No.

TWO: Isn't that from *Metropolis*?

ONE: So what? It's a good lesson. Better than anything in this clunky stinker.

THREE: I learned a lesson – never agree to appear in a student production without reading the script. I turned down a chance to do Mamet for this.

FOUR: I kind of like it.

TWO: Kiss ass.

FOUR: I did!

TWO: And just what episode of the Twilight Zone was that ending ripped off from?

DIR.: How should I know? I'm just the Director.

Curtains close and lights fade on the ACTORS and DIRECTOR bickering.

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