Alex Fratzl, Avenue Églantine 4, 1006 Lausanne, Switzerland
Telephone: +41 789 46 63 78, E-mail: alex.fratzl@epfl.ch

To the
Bertarelli Program in Translational Neuroscience and Neuroengineering
Harvard Medical School and EPFL Center for Neuroprosthetics

Subject: Bertarelli Fellowship in Translational Neuroscience and Neuroengineering
Application

Dear Members of the Jury,

Please find enclosed the documents relating to my application for the above-mentioned fellowship. I would like to thank you for your consideration.

Sincerely yours,

Alex Fratzl,
Master Student EPFL

Enclosures:

- Statement of purpose
- Curriculum vitae
- Reference letter following research internship at CeMM, Vienna, Austria
- Evaluation of research internship at Max Planck Institute, Berlin, Germany
- Statement of results, EPFL

Statement of purpose

Currently, I am studying at the Swiss Federal Institute of Technology in Lausanne (EPFL). As a first year Master student, I am following the Neuroscience and Neuroengineering track of the Life Sciences and Technologies Master. The bachelor's program in Life Sciences and Technologies at EPFL was completed in June 2015.

I was always very interested in both, mathematics and physics, as well as in biology and more life sciences related topics. For this reason, the Life Sciences bachelor's program at EPFL appealed particularly to me, in comparison to programs offered by other universities, because of its strong focus on analytical and engineering skills in addition to general biological topics.

The broad range of topics covered by the bachelor's program allowed me to find out which subject would truly fascinate me. We had amongst others classes in genetics and molecular biology, in chemistry, in classical and quantum mechanics, in calculus, in statistics, in informatics, in electronics, in physical biology and in physiology. I liked most of them, but the topics that were the most interesting to me included those in which analytical methods could be directly applied to the understanding of biological and physiological phenomena. It was last year, during our first neuroscience lectures, that I fully realized my choice coming to EPFL was the right decision. This research area combines the need for strong knowledge in genetics and cellular biology with the requirement of powerful analytical and engineering approaches, in order to describe and – hopefully – one day understand the underlying mechanisms of the nervous system. This fascinating field seems to encompass perfectly all my professional interests.

I got even more convinced while taking the course "Neuroscience for engineers" during the past semester. There I understood the impact that neuroscience and neuroengineering already have and especially will have in the future on human health. The emerging field of neuroprosthetics will likely alleviate major diseases, such as Alzheimer or Parkinson, or enable the development of innovative devices that will help disabled or injured patients. This research area is truly inspiring, because it will deepen our understanding of the brain and the nervous system in an unprecedented manner. There is clearly still an incredibly large universe to discover.

The bachelor's thesis project in the lab of Carl Petersen was a truly great experience in working both experimentally and computationally. Within our group, we performed optical imaging of intrinsic signals in slightly anesthetized mice and then analyzed the so obtained data by means of image processing techniques. It confirmed that our scientific background acquired at EPFL enables us to work both in a wet lab and with analytical techniques. These are the reasons why I chose to do my Master's program in the Neuroscience and Neuroengineering track. In order to gain additional practical experience, I started working as research assistant in the lab of Ralf Schneggenburger in November 2015.

Therefore, I want to apply for the Bertarelli Fellowship in Translational Neuroscience and Neuroengineering. In applying for this fellowship, I would like to obtain a better understanding of brain circuitry and of signaling in neuronal networks by working with a well-known research group in the field. My goal is to learn using state-of-the-art techniques to perform *in-vivo* and *in-vitro* recordings and, therefore, to link neuronal circuitry to behavior. I find the combination of optogenetics, electrophysiology and calcium imaging particularly fascinating, as this might help decoding the brain. I really want to learn to use these techniques in order to help developing technology and knowledge for recovery or augmentation of neural function lost to disease or trauma. To be able to carry out the Master thesis project at the Harvard Medical School would be a unique and amazing opportunity. My preference would be to join the labs of Mark Andermann, Chinfei Chen or of Bradford Lowell, but also those of Vadim Bolshakov, Venkatesh Murthy or Bernardo Sabatini would provide an incredible experience for me.

For this reason, I would be extremely grateful for support by the Bertarelli Foundation.

Curriculum Vitae

Personal details

Name and surname:	Alex Fratzl, BSc
Address:	Avenue Églantine 4, 1006 Lausanne, Switzerland
Telephone:	CH: +41 789 46 63 78, AT: +43 680 23 83 579, DE: +49 176 210 10 888
E-mail:	alex.fratzl@epfl.ch
Birth date:	04.07.1993
Nationality:	Austrian

Education

1999 – 2003:	Lycée Français de Vienne, Vienna, Austria
2003 – 2011:	Französisches Gymnasium (FG), Berlin, Germany
2011:	Graduation with the German "Abitur" (average grade 1.0) and the French "Baccalauréat scientifique" (with the grade excellent, "mention très bien avec félicitations du Jury")
2012 – 2015:	Bachelor student in Life Science and Technology at EPF Lausanne, Switzerland
Spring 2015:	Bachelor's thesis in Sensory Processing (Carl Petersen's lab), EPFL
Since 2015:	Master student in Neuroscience and Neuroengineering at EPFL

Professional experience

2011 – 2012:	Social service at ESRA, Psychosoziales Zentrum, Vienna, Austria
Summer 2014:	Five-week research internship at the Research Center for Molecular Medicine (CeMM), Vienna
Summer 2015:	Eight-week research internship at the Max Planck Institute for Molecular Genetics (MPIMG), Berlin
Fall 2015:	Teaching assistant in Analysis III (Life Science and Technology)
Since 2015:	Research assistant in Ralf Schneggenburger's lab, EPFL

Additional information

Languages:	French – mother tongue German – mother tongue English – fluent language skills Spanish – basic knowledge Italian – basic knowledge
Other:	2008 – 2011: class representative (FG Berlin) Since 2012: class representative (EPF Lausanne) Since 2013: involved in the Life Science students' association and in the general students' association of EPFL Since 2014: member of the Life Science School Council 2014 - 2015: Responsible for the organization of the study trip to Chile in Summer 2015

Ce-M-M-
Research Center for Molecular Medicine
of the Austrian Academy of Sciences

ÖAW
Österreichische Akademie
der Wissenschaften

Vienna, September 22, 2014

Letter of recommendation for Mr. Alex Fratzl

To whom it may concern

Mr. Alex Fratzl joined the bioinformatics group I head for a one-month internship during August 2014. He realized bioinformatic experiments on protein interaction networks to capture tissue specific interactomes.

Alex could cope with the project very well despite the short duration of his internship. He essentially implemented all the functions I originally planned in a creative way. I was impressed by his versatile skills that nicely reflected the nature of his training at the EPFL: molecular biology and basics of computational sciences. He integrated my group very well and interacted constructively with the PhD student whose project was related to the tests Alex performed for us.

I can warmly recommend Alex for any future position. I am sure he will provide high quality, innovative work.

Feel free to contact me if you would desire additional information.

Yours Sincerely,

Jacques Colinge, PhD, Full Professor

CeMM Research Center for Molecular Medicine of the Austrian Academy of Sciences
Lazarettgasse 14, AKH BT 25.3, 1090 Vienna, Austria, Phone +43-1/40160-70011, office@cemm.oeaw.ac.at, www.cemm.at

ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Titre	Bioinformatic Analysis of Genome Evolution
Nom de l'étudiant	Fratzl Alex
Entreprise	Max Planck Institute for Molecular Genetics
Lieu	14195 Berlin - Germany
Dates début et fin de stage	20.07.2015 - 11.09.2015

Application of scientific and technical knowledge

Technical skills and knowledge

[X] Excellent [ ] Good [ ] Sufficient [ ] Insufficient [ ] Non applicable

Remarks

The trainee showed a very high proficiency in programming in C++. It was very easy and straight forward for him to implement even elaborate algorithms in a very time fashion.

Ability to resolve complex problems

[X] Excellent [ ] Good [ ] Sufficient [ ] Insufficient [ ] Non applicable

Remarks

The trainee was able to resolve even "hard problems" by himself.

Mastery of domain-specific methodologies

[X] Excellent [ ] Good [ ] Sufficient [ ] Insufficient [ ] Non applicable

Remarks

The trainee showed a deep knowledge and understanding of the methods we had to use.

Planning and management of work tasks

Definition of work objectives and management of priorities

[X] Excellent [ ] Good [ ] Sufficient [ ] Insufficient [ ] Non applicable

Evaluation of resources required

[X] Excellent [ ] Good [ ] Sufficient [ ] Insufficient [ ] Non applicable

Work planning, monitoring of activities, and management of emergent issues

[ ] Excellent [ ] Good [ ] Sufficient [ ] Insufficient [X] Non applicable

Integration in the professional world

Respect for the organizations procedures/ rules and for their professionâ##s ethical codes

[X] Excellent [ ] Good [ ] Sufficient [ ] Insufficient [ ] Non applicable

Capacity to work in teams

[X] Excellent [ ] Good [ ] Sufficient [ ] Insufficient [ ] Non applicable

Remarks

The trainee integrated immediately into the team and was well respected. It was easy to communicate with him.

Quality of the work delivered

[X] Excellent [ ] Good [ ] Sufficient [ ] Insufficient [ ] Non applicable

Communication

Written communication (structure, clarity, coherence of reasoning)

[X] Excellent [ ] Good [ ] Sufficient [ ] Insufficient [ ] Non applicable

Oral communication (clarity, reasoning, self-confidence)

[X] Excellent [ ] Good [ ] Sufficient [ ] Insufficient [ ] Non applicable

Interpersonal skills and engagement, including in a multicultural context

[X] Excellent [ ] Good [ ] Sufficient [ ] Insufficient [ ] Non applicable

Independence

Ability to present and defend her/his own ideas

[X] Excellent [ ] Good [ ] Sufficient [ ] Insufficient [ ] Non applicable

Capacity to access sources of information and to evaluate them

[X] Excellent [ ] Good [ ] Sufficient [ ] Insufficient [ ] Non applicable

Capacity to self-evaluate and to respond constructively to feedback

[X] Excellent [ ] Good [ ] Sufficient [ ] Insufficient [ ] Non applicable

Overall Evaluation

[X] Excellent [ ] Good [ ] Sufficient [ ] Insufficient [ ] Non applicable

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ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Relevé des résultats (23.12.2015) pour / Statement of results (23.12.2015) for

Fratzl Alex

Plan BA/MA
Section:Sciences et technologies du vivant
Section:Life Sciences and Technologies
Matricule fédéral : 12-803-813
Federal number

Matières	Forme *Forms*	Session	Note ou (moyenne) *Grade or (average)*	Crédits ou (Coeff) *Credits or (Coeff)*	Crédits obtenus *Obtained credits*	
Master SV-STV				**120**	**8**	**Résultat provisoire** *Intermediate result*
Cycle master				**90**	**8**	**Résultat provisoire** *Intermediate result*
Master cycle						
Groupe 1				**15**	**0**	**Résultat provisoire** *Intermediate result*
Group 1						
Neurosciences I : molecular neuroscience and neurodegeneration	E			5		
Neurosciences II : cellular mechanisms of brain function	E			5		
Groupe 2				**7**	**0**	**Résultat provisoire** *Intermediate result*
Group 2						
Data analysis and model classification	E			4		
Image processing I	E			3		
Groupe 3				**8**	**8**	**Réussi** *Passed*
Group 3						
Stage d'ingénieur (master en Sciences et technologie du vivant) *Engineering internship (master in Life Sciences and Technology)*	PS	09.2015	Réussi *Passed*	8	8	
Groupe 4				**6**	**0**	**Résultat provisoire** *Intermediate result*
Group 4						
Mythes de la Méditerranée ancienne I *Myths of the ancient Mediterranean Sea I*	PS			3		
Groupe 5				**6**	**0**	**Résultat provisoire** *Intermediate result*
Group 5						
Scientific project design in integrative neurosciences	PS			6		
Groupe 6				**48**	**0**	**Résultat provisoire** *Intermediate result*
Introduction au droit et à l'éthique en STV *Introduction to Law and ethics in LST*	O			3		
Unsupervised and reinforcement learning in neural networks	E			4		
Bachelor			**(5.41)**	**180**	**180**	**Réussi** *Passed*
Cycle Bachelor			**(5.56)**	**120**	**120**	**Réussi** *Passed*
Bachelor cycle						
Branches de 3ème année			**(5.60)**	**56**	**56**	**Réussi** *Passed*
Third year courses						
Bloc 3 "Engineering"			**(5.50)**	**14**	**14**	**Réussi** *Passed*
Block 3 "Engineering"						
Signaux et systèmes I,II (pour SV) *Signals and systems I,II (for SV)*	E	07.2015	5.5	6	6	
Systèmes électriques et électroniques I *Electrical systems and electronics I*	PS	02.2015	6	4	4	
Systèmes électriques et électroniques II *Electrical systems and electronics II*	PS	07.2015	5	4	4	
Bloc 4 "Biosciences"			**(5.83)**	**23**	**23**	**Réussi** *Passed*
Block 4 "Biosciences"						
Modélisation mathématique et	E	02.2015	6	4	4	

Voir les remarques présentes à la fin du relevé / *Please read the remarks at the end of this statements of results*

Suisse, Lausanne, le 23 décembre 2015 / *Switzerland, Lausanne, 23rd december 2015*

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computationnelle en biologie *Mathematical and Computational Models in Biology*						
Physiologie par Systèmes I *Physiology by systems I*	E	02.2015	5	4	4	
Physiologie par Systèmes II *Physiology by systems II*	E	07.2015	6	4	4	
Project in bioengineering and biosciences	PS	07.2015	6	5	5	
Travaux pratiques de physiologie I,II *Physiology lab I,II*	O	07.2015	6	6	6	
Bloc 5 ***Block 5***			**(5.39)**	**19**	**19**	**Réussi** ***Passed***
Biologie du développement *Developmental Biology*	E	07.2015	6	4	4	
Fluid mechanics for SV	E	02.2015	5.5	4	4	
Génétique et génomique *Genetics and genomics*	E	02.2015	5	4	4	
Neuroscience for engineers	E	07.2015	5.5	3	3	
Structural mechanics (for SV)	E	02.2015	5	4	4	
Branches de 2ème année ***Second year courses***			**(5.50)**	**56**	**56**	**Réussi** ***Passed***
Bloc 1 "Mathématiques et Physique" ***Block 1 "Mathematics and Physics"***			**(5.50)**	**35**	**35**	**Réussi** ***Passed***
Analyse III *Analysis III*	E	02.2014	5.5	4	4	
Analyse IV *Analysis IV*	E	07.2014	5.5	4	4	
Analyse numérique *Numerical analysis*	E	07.2014	5.5	3	3	
Physical biology of the Cell I	E	02.2014	5	3	3	
Physical biology of the Cell II	E	07.2014	6	3	3	
Physique générale III *General physics III*	E	02.2014	5.5	6	6	
Physique générale IV *General physics IV*	E	07.2014	6	4	4	
Probabilités et statistique I *Probabilities and statistics I*	E	02.2014	5.5	4	4	
Probabilités et statistique II *Probabilities and statistics II*	E	07.2014	5	4	4	
Bloc 2 "Sciences du vivant et informatique" ***Block 2 "Life sciences and Computer-aided engineering"***			**(5.50)**	**21**	**21**	**Réussi** ***Passed***
Biological chemistry II (for SV)	E	02.2014	5.5	3	3	
Biological chemistry III	E	07.2014	5	3	3	
Biologie cellulaire et moléculaire II *Cellular and Molecular Biology II*	E	02.2014	5.5	3	3	
Cellular and Molecular Biology III	E	07.2014	6	3	3	
Labo intégré en sciences de la vie I,II *Integrated labo in Life sciences I,II*	PS	07.2014	5.5	6	6	
Projets en informatique (pour SV) *Project in Informatics*	PS	02.2014	5.5	3	3	

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Bloc transversal SHS			**(5.75)**	**8**	**8**	**Réussi**
Transverse block HSS						***Passed***
Méditerranée: grands textes et mythes fondateurs A	PS	02.2014	6	2	2	
Mediterranean myths and founding texts A						
Enjeux politiques contemporains B	PS	07.2014	5.5	2	2	
Contemporary political issues B						
Méditerranée: grands textes et mythes fondateurs C	PS	02.2015	6	2	2	
Mediterranean myths and founding texts C						
Méditerranée: grands textes et mythes fondateurs D	PS	07.2015	5.5	2	2	
Mediterranean myths and founding texts D						
Examen propédeutique			**(5.11)**	**60**	**60**	**Réussi**
Foundation year exam						***Passed***
Branches d'examen			**(5.04)**	**(19)**		**Réussi**
Examination courses						***Passed***
Algèbre linéaire I	E	02.2013	5	(1)		
Linear algebra I						
Algèbre linéaire II	E	07.2013	5	(3)		
Linear algebra II						
Analyse I	E	02.2013	4.5	(1.5)		
Analysis I						
Analyse II	E	07.2013	6	(2.5)		
Analysis II						
Biologie cellulaire et moléculaire I	E	07.2013	4.5	(2)		
Cellular and Molecular Biology I						
Chimie biologique I (pour SV)	E	07.2013	5.5	(2)		
Biological chemistry I						
Chimie générale	E	02.2013	5	(1.5)		
General chemistry						
Chimie organique (EPFL)	E	02.2013	5	(1.5)		
Organic chemistry (EPFL)						
Physique générale I	E	02.2013	4.5	(2)		
General physics I						
Physique générale II	E	07.2013	5	(2)		
General physics II						
Branches semestrielles			**(5.29)**	**(7)**		**Réussi**
Semester courses						***Passed***
Biologie I,II	PS	07.2013	5	(2)		
Biology I,II						
Informatique I,II	PS	07.2013	5.5	(4)		
Computer-aided engineering I,II						
La connaissance dans tous ses états	PS	02.2013	4.5	(0.5)		
Knowledge from every angle						
Art, création et créativité	PS	07.2013	5.5	(0.5)		
Art, creation and creativity						

Voir les remarques présentes à la fin du relevé / *Please read the remarks at the end of this statements of results*

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Remarques:
- Il se peut que des crédits et des moyennes ne soient pas calculés en fonction de la date d'impression du relevé de notes.
- Les notes et décisions sont masquées durant la période des examens. Les notes redeviennent visibles à la fin de la session d'examens et sont définitivement confirmées durant la Conférence des Examens, suite à laquelle les décisions apparaitront.
- Seul le bulletin original imprimé sur du papier blanc avec un filigrane central et signé par le Vice-Président pour les Affaires Académiques fournit les résultats définitifs.
- Formes d'examens : E=écrit, O=oral, PS=pendant le semestre, EO=écrit & oral, MULTI=multiple, M=mémoire, EX=exposé, TP=rapport de TP, ECH=hors plans
- Les travaux sont notés de 1 à 6 (meilleure note), 4 étant la limite de réussite. Si l'étudiant-e n'effectue pas l'épreuve à laquelle il-elle est inscrit-e, elle est notée NA (non acquis)

Remarks:
- *It is possible that some credits and averages have not been calculated at the time this statement was printed.*
- *Marks of an exam session remain hidden until the end of the session and official decisions will only appear once the Conference for ratification of examination results has taken place and confirmed all results.*
- *Only the original mark sheet printed on white paper with central pale pink impression and signed by the Vice-President for Academic Affairs, is considered as the final result.*
- *Examination forms : E=written, O=oral, PS=during the semester, EO=written & oral, MULTI=multiple, M=term paper, EX=oral presentation, TP=project report, ECH=out of study plan*
- *Assignments are graded from 1 to 6 (top grade), 4 being the pass level. If the student fails to do the test for which (s)he is enrolled, it is graded NA (not obtained)*

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Suisse, Lausanne, le 23 décembre 2015 / *Switzerland, Lausanne, 23rd december 2015*